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(13)

KOFORD, CARL
DECEMBER 1959 - DECEMBER
PRAIRIE DOG ECOLOGY PROJECT
UTAH - WYOMING - COLORADO - S. DAKOTA
KANSAS.
December 1959 - December 1965
CATALOGUE NOS. 1765-1930
JOURNAL
SPECIES ACCOUNT
CYNOMYS ludovicianus

KOFORD, CARL
DECEMBER 1954 - DECEMBER
Prairie Dog Ecology Project
UTAH - WYOMING - COLORADO - S. DAKOTA -
KANSAS -
December 1954 - December 1955
CATALOGUE NOS. 1769 - 1770
JOURNAL
SPECIES ACCOUNT
Cynomys ludovicianus

KOFORD, CARL
Prairie Dog Ecology Project
UTAH - WYOMING - COLORADO
S. DAKOTA - KANSAS
DECEMBER 1954 - DECEMBER 1955
CATALOGUE NOS. 1769-1770
JOURNAL
SPECIES ACCOUNT
Cynomys ludovicianus

CATALOGUE

Koford

1955

Specimen Catalog

Feb. 15 Ft. Collins, Larimer Co., Colo. 5000 ft.

skel.
1769 ♂ Cynomys ludovicianus 377-89-65-16. 912 gms.

Fat. Stom. empty. Trapped.

Oct. 15 8 1/2 mi. N. 1 1/2 mi. W. of Waverly, Larimer Co., Colo.

1770 ♂ Onychomys leucogaster 144-40-19-16. 30 gms. mod. fat.

Testes tiny. Stom. full; 90% insect parts. 10± nemat. in stomach.

On flat short grass plain near Cynomys burrow + Atriplex brush.

At Nematodes stomach (saved).

JOURNAL

Koford
1959

Prairie Dog Ecology Project

Journal I

August 12, 1954 Berkeley to Salt Lake City, Utah

At request of Mr. Fairfield Osborn, President of N. Y. Zoological Society, I am traveling to Moose, Wyoming, where he is temporarily staying, to talk with him about the objectives and extent of a project to study the prairie dog in association with Kansas University. At 6:25 p.m. I departed from Oakland Airport on UAL plane, for Salt Lake City. Flight path passed over Donner Pass, Donner Lake, in Calif. Arrived S. L. C. airport, about 3 mi. from city, at 9:30 p.m. Stayed at Newhouse Hotel.

August 13, 1954. Friday. Overcast, windy, with a few drops of rain at 6:30 a.m. To airport to leave on Western AL (for Jackson via Idaho Falls) at 7:10 a.m. Plane stopped at Pocatello, a rather flat dry grass region, then at Idaho Falls—the latter green with many neat farms. Then by another plane to Jackson Hole, flying low over the rugged Teton Range. A little dirty snow remained. I was met at airport by Osborn and his wife. We did various errands in Jackson and had cocktails and lunch there. Osborn is trying to organize a project for me that is not just a study of prairie dogs and which is not necessarily connected with Kansas Univ. The money should be spent for conservation of wildlife. Osborn himself is keen for ecological projects. He has a personal strong interest in prairie dogs from boyhood experience. He would like to see a study made that would be ammunition to use against killing of animals

W C Garst
500 Cedar St.
Douglas, Wyo.

Sent info on Wind Cave
e.a. + b.f.f. – to R H Pough, Jan 20, 1959

George Barnes, F & W Service, Custer,
located b.f.f. – 5 captured in
p.d. town nr Midland, SD. –
To Wind Cave
Barnes had seen 5 others in 3 [illegible]
Bad Lands Monument.
Jim Simon one ferret. –

Journal

August 13, 1954 Jackson, Wyoming

(rodents especially) by control agencies. The project should involve the plains and not just one species. Work that would tie in with that of Helmut Buechner (now making a survey of bighorn populations) would be best.

(Osborn does not like to kill anything. He hates sheep, likes bats.) The work would have to be written up in appetizing form that could be easily understood by N.Y. Zool. Soc. members. (Mrs. Osborn energetic and well preserved for her estimated age. Mr. an ardent fisherman. We fish in the Snake this of evening. They have a cabin near Moose (on Snake R.). Tomorrow we will go to the biol. station at Moran.). I was put up in a log cabin at Moose. Partly overcast, windy, a clouds over Tetons today. Fished with Osborn in evening. We took 5 cutthroat on flies, largest 17" (by Osborn). Full moon. Dinner & much talk with Osborn. He is very likeable, friendly, & unassuming for a wealthy & rather famous man. Osborn had a copy of a letter ~~that~~ was sent by W.E. Garst (500 Cedar St, Douglas, Wyo.)(recently photographing for Disney film I believe) to Richard Pough (Amer. Mus.) regarding prairie dogs in Wind Cave National Park, South Dakota (Black Hills). Apparently prairie dogs were being poisoned, or going to be, in the park. Garst ~~told~~ said the thought was ~~that~~ Cynomys was eating vegetation that should be utilized by ~~the~~ antelope & bison. Garst said in most areas of park the vegetation was best on areas where there were prairie dogs. Five

Journal

August 13, 1954 Moose, Wyoming

black footed ferrets had been trapped near Midland, S.D., thru help of George Barnes, F+W Service, Custer, + taken to Wind Cave. One(?) died + 2(?) escaped in park. The idea was to introduce natural predator control of the prairie dogs. Barnes also said to have seen 5 ferrets near S border of Bad Lands Nat'l Monument, S.D. Jim Simon (I met his wife - Osborn likes him much - headquarters in S.L. City) knows of the Wind Cave situation. Osborn is going to visit Wind Cave on way back to N.Y.

August 14, 1954 Moose + Moran, Wyoming.

With Mr. + Mrs. (Margaret) Osborn I went to the biological lab of N.Y. Zool. Soc. Helmut Buechner, now working on a survey of bighorn populations + range conditions) also there. And Mr. Oberhansley (sp.? -), supervisor of Teton Nat'l Park, his assistant, another park (?) man named Krees, Reed Fautin, ecologist of Laramie + Univ. of Wyoming, + Margaret Altman, studying behavior of elk in the laboratory region. Osborn + I talked over our ideas + we had some discussion. It was agreed that a study of prairie dogs (and other range rodents) in relation to predators (coyotes, ferrets, etc.) and to range conditions (overgrazing) and grazing animals (domestic and bison, antelope) would be worthwhile. Fautin was very interested + appeared to be very capable himself, with a good knowledge of range problems. He was sure ~~that~~ Univ. of Wyoming would cooperate strongly. We also felt ~~that~~ Colorado A+M (Ft. Collins, where Paul Baldwin ~~is~~ teaches) and Montana

Journal

August 14, 1954 Moose, Wyoming

Univ. (Missoula) would be willing to help. Fautin told of an experiment station in Colorado where deer, under fence in different concentrations, are kept, in order to measure the relative effects on range. He said another large area in W. Colo. has been voluntarily closed by ranchers (owners) to protect coyotes. These areas would provide good experimental setups for study. //My problem now is to define the objectives of the study and get preliminary lineup of collaborators + specific problems. Osborn wants results that will lead to positive concrete action. I mentioned the Sierra Club interest in a prairie national park - Osborn thought this would be a wonderful practical application of results. //Olaus Murie was to have gone to Brooks Range, Alaska, to recommend an artic wilderness area. Murie got TB, now spread to meningitis, + may recover slowly, but his Alaska work halted, of course. //Fautin is starting an ecological survey of Swan Lake, Teton area, because soon it is going to be used as a dump for processed sewage and conditions will surely change rapidly. // Osborn has hobby of keeping pet birds, especially rare ones (a Chinese bulbul, for example), + breeding fancy pheasants. He is also involved in N.Y. Zoo. + raising money for it. Fautin + Clark of Univ. Wyo. apparently are committee to pass on projects for the Jackson Hole Biol. lab. // Fished Snake in evening. Took 2 cutthroat, to 13." Dinner with Osborns and Mr. + Mrs. Fabian (spell?) from Salt Lake City. F. is lawyer for the Moran station + ~~[illegible]~~

Koford
1954

Journal

August 15, 1954   To San Francisco, Calif.
Osborn took me to Jackson airport. Rough bumpy flight with 3 stops en route to S.L. City. Then I took 12:40 plane for S.F. Clear day & good flying visibility. Sue & kids met me at S.F. (4 p.m.) & we returned home to Berkeley.

December 2 - 10, 1954. To Ft. Collins, Colorado.
Departed Berkeley afternoon Dec. 2. Drove via Bakersfield, Walker Pass, Death Valley, Boulder City, Kingman (Ariz.), Grand Canyon, Cameron, Kayenta, Bluffs (SE Utah), Monticello, Cortez (S W Colo.), Mesa Verde Nat'l Park, Durango, Wolf Creek Pass, Kenosha Pass, to Denver, then Ft. Collins, arriving afternoon Dec. 9. Stayed with Paul Baldwin & family.

December 11. With Baldwin looked over Colo. A & M College libraries and facilities. Met Olson, head of Zool. Dept., & other members that dept. Hanson from Utah, a mammalogist interested in *Citellus*, teaching here this year. Visited a *Cynomys ludovicianus* colony near base of Spring Canyon dam with Baldwin.

December 13. Monday. Into house at 637 Smith yesterday. today visited Forest & Range Experiment Station. Mr. Raymond Price offered much cooperation & a desk for work. Mr. Elbert Reid, range mgt., spent most time with me. Victor Scheffer of Fish & Wildlife Service is here working on rodent problems, especially on Black Mesa (SE of Grand Junction). Mr. Don Hervey of Rge. Mgt. dept. of college very interested in my work. He offered use of experimental range area west of college on college lands. ~~Ft~~ The F & R Exp. Sta. has an

Koford
1954

Journal

December 13, 1954   Ft. Collin's, Colorado.
experimental range N. of Nunn where I can probably work too. A map shown to me by Harvey showed that to nearly all of Weld Co. (& pts. adjacent) was in a comparatively dry area, rainfall 13-15," & apparently there center of livestock rather than wheat region.

December ~~14~~15, 1954. Visited college lands west of Ft. C. where old Cynomys town. Read thesis by Dano on cottontail-prairie dog relationships (lent by Lee Yeager).

December ~~15~~16, 1954. Talked with G.E. Klipple, in charge of Central Plains Range Experiment Station (near Nunn). Have been provided working space in For. & Rge. Exp. Sta., Forestry Bldg., Colo. A.+M. Started reading King's thesis on Wind Cave prairie dogs. Meeting of Rod & Gun Club in eve. Met James Cole, Prof. Wagar, & many others there.

December 17, 1954. With Gurney Crawford visited a Cynomys ludovicianus town on a "game preserve" about 2 miles east of Wellington. This 80 acres a demonstration area of local sportsmen. They put out much cover (branches, stumps, wire), & feed, & trapped carnivores (skunks & housecats mostly) there, & had introduced quail (scaled?).

December 18, 1954. Took a trip about 30 miles by road to west thru Masonville & up Buckhorn Canyon. Road icy at higher levels (8000') in shade. Saw a prairie dog town (C. sp.?) at about 7000 ft. (no dogs now).

December 19, 1954. Comparatively warm but windy. With family visited "game preserve" near Wellington and photoed prairie dogs.

16
40/640
40
240

Journal

December 23, 1954 To Rocky Mtn. Nat'l Park, Colo.

Clear sunny day. Drove 50± mi. to R.M. Nat'l Park to visit James Cole, regional naturalist. He loaned to me reports & maps concerning *C. l.* (*Cynomys ludovicianus*) towns at Wind Cave & other areas under N.P.S. control. Much ice in Big Thompson River. At foot of Hidden Valley the kids fed chickarees, gray jays, and Clarks nutcrackers, all of which fairly tame.

December 28, 1954 Nr. Ft. Collins, Colorado.

With Mr. G. E. Klipple of the Agricultural Research Service, USDA, visited the Central Plains Experimental Range. Saw three jackrabbits (Klipple says both black & white-tailed present), cottontails, a dead golden eagle (probably shot), and 4 or 5 buteos (*lagopus* probably). Only about 1" snow here though about 6" in Ft. Collins (snowed Dec. 26 & 27). The station in gently rolling country. Some *atriplex* in pastures but mostly grama-buffalo grass. Various degrees use on various pastures for 15 yrs. 60-70 head/~~acre~~ section considered heavy stocking (overgrazing), 20-30 head considered light. Klipple had worked here, on & off, for 20 years. Now he was in charge of the range. A small house suitable for stays here was available. Weather data kept too. A favorable site for wildlife studies. Returned to Ft. Collins. The experimental range was 37 miles from Colo. A & M College - 3½ mi. E. & 9 mi. N. of Nunn (wheat farming town). Range about 4 X 6 miles max. dimensions. Klipple showed me small *Cynomys* colony in section 22.

Journal

December 29, 1954   Nr. Ft. Collins, Colorado.
Finished reading & abstracting King's prairie dog thesis on microfilm. Visited Dr. Harrington, taxonomist in botany; Mason, supervisor of Roosevelt Nat'l Forest; and office of "county agent." About 38° today, overcast afternoon & threatening to snow.

December 30, 1954. About noon visited prairie dog colony near Spring Canyon Dam and saw Cynomys l. out tho ground snow covered. About 3" snow there. Horsetooth Reservoir half frozen over.

January 2, 1955. Sunny & about 40°F today. In mid-afternoon visited prairie dog colony and viewed tracks & burrows. Most snow ~~t~~ in Ft. Collins not melted in sunnier areas, persisting in shade.

January 3. Talked with J. L. Retzer, soils man at F+R Exp. Sta. about soils & rodents. Clear sunny day. Copied Cynomys data from maps lent by G. E. Klipple ("Zeke"). Visited Wellington Cynomys colony with V. B. Scheffer. Saw one flying golden eagle + 2 hawks perched but none in flight (still air; smoke layers).

January 4, 1955. With G E Klipple attended annual meeting of Crow Valley Livestock Assn. on the land utilization project (headquarters Briggsdale). This year grazing on gov't land will be light (half no. animals of a few years ago) because of low rainfall in 1954 & little growth. Last year 45 days of grazing on old growth; this has been grazed off now so must wait

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1955

Journal

January 4, 1955 Nr. Ft. Collins, Colorado.
for now. On Central Plains Exp. Range, lowest recorded rainfall (about 5"). No livestock will be put on until about May 15. Meeting was of about 60 men, about 45 being members of association. I met many landowners that had, or used to have, *Cynomys* colonies on their lands.

January 5, 1955 Library work in Forestry Library. Grassland succession in True Prairie (tall grass) has been worked out by Weaver (& others) of Univ. Nebraska. Snow last night, about 5" & wet, & a little fell in forenoon.

January 6, 1955. Near 0° F. last night. Snow light & cold now. Visited a *Cynomys* colony & found tracks showing a few out but not traveling far. Max. temp. in shade < 30°F. Arranged for purchase of Chev. pickup.

January 7, 1955. Near 0°F. last night. Sunny & clear but cold & calm today. Got new Chevrolet pickup for use in prairie dog work.

January 8, 1955. Secured preservatives from Zoology Dept., Colo. A & M., & vials. Visited prairie dog colony late afternoon. Still no more activity above ground. Cold but only slightly overcast today.

January 9. With family visited Hidden Valley in Rocky Mtn. National Park. Only about 6" snow at 9000!

January 10. Arranged to buy pickup truck in Ft. Collins. Much ado about licensing, Colo. operator's license, etc.
Visited Central Plains Exp. Range with Klipple & Scheffer.

January 11. Got truck & put field eqpt. in order. Borrowed equipment from Forestry Dept. via Prof. Wagar, & Coop. Wildlife Unit via Yeager.

Journal

January 12, 1955 W. Weld Co., Colorado.

Clear & sunny but cold. About 3" snow still on ground in Ft. Collins. I drove east to Ault, N. to Pierce & Nunn, then to Central Plains Exp. Range. Spent afternoon on *Cynomys* colony there. Saw at least 5 golden eagles & 2 *Buteo lagopus*. Saw eagle *Aquila* eating white-tailed jackrabbit *Lepus*. Max. temp. about 35°F. Some roads at Exp. range had to be detoured because of snow (6") in roadbed. Horned larks *Otocoris* in flocks to 50± & common. *Sturnella neglecta* common at roadsides. Saw 1 sparrow hawk (or pigeon h.?) and one *Falco mexicanus* (nr. Ault). Sunset 4:35 p.m. Saw 2 *Lepus californicus* about 5 p.m. among *Atriplex* bushes. Apparently white-tailed *Lepus townsendi* on open ground mostly. Vegetation on range very short - mostly 1" or less but yucca, *Atriplex*, *Chrysothamnus*, ~~sm~~ *Opuntia*, scattered. At 4:30 p.m. about 3 mi. S. of Rockport I saw 21 *Antilocapra* near road (highway 85). Stayed at C.P.E.R. for night. ~~Clear~~

January 13, 1955. Clear, cold night. −16°C. minimum. Heard a horned owl (*Bubo*) last evening. At 7:30 a.m. I saw a group of 4 coyotes (*Canis latrans*) about 300 yds. N. of C.P.E.R. buildings. I spent morning searching for *Cynomys* colony on section 16 & 17, R 65 W, but found it not. Saw *Lepus californicus* & *L. townsendi*, *Aquila*, *Buteo lagopus*, *Otocoris*. About 55°F. at mid-day, & little wind. Visited Mr. Henry Prange & then his *Cynomys* colony. Drove to Ft. Collins via Russell & Pierce.

January 15, 1955 To Laramie, Wyoming, & return

Drove via Owl Canyon to Laramie to visit Reed W. Fautin

Journal

January 15, 1955 Laramie, Wyoming.

~~of ecology~~), of zoology dept. Met Fautin at Univ. Wyo. & later at home & talked about plans & procedures for my Cynomys study. The Snowy Range about 40 mi. W. of Laramie seemed to have much snow on it. Windy in Laramie (7150' elev.). Much sheep grazing in this region of Wyoming, according to R.W.F. Dick Heard of U.S.F.S. stationed here & might be of some help to me, said F. Half overcast in afternoon. # Drove to Cheyenne, quickly getting into pinyon & Ponderosa pine upon ascending the range east of Laramie. Shortly before reaching Cheyenne from W, wonderful view of vast plains of short grass in that area & to E. & S. Cheyenne fairly large, dirty, & bustling. Hquarters of Warren Livestock Co. which controls much land in Wyo. & Colo. prairie dog country. Continued on to Ft. Collins in evening. Saw 2 jackrabbits near road (highway 87) at night. Still about 3" snow on ground in Cheyenne area but none in town of Laramie (15000 population).

January 17, 1955. Ft. Collins, Colo.

Snow in night & a little today (2" total). Office work.

January 18, 1955 Weld Co., Colo.

Drove to Briggsdale & talked with W. Williamson, U.S.F.S., about Cynomys colonies. Then talked with Mr. Jenkins, postmaster & crop-duster (flier) of Briggsdale, & with Willard Frank, long resident of that town. Then drove to Grover, about 8 mi. E. to see Pawnee Buttes from top (sandstone outcrops 200± high), then to C.P.E.R. Saw 12± Buteo lagopus, 1 Falco

Journal

January 18, 1955 Weld Co., Colo.

mexicanus, 4 *Sylvilagus*, 3 *Lepus townsendi*, 3 *Lepus californicus*, 1 *Aquila chrysaetos*, many *Otocoris* + *Sturnus vulgaris* (30± at Briggsdale), *Pica pica*. Mr. Franks + wife said that, compared with 20 yrs. ago, now very few *Cynomys* but many badgers, about same no. eagles, hawks, + pronghorns, many cottontails, mule deer (unknown 20 yrs. ago), few coyotes. Jackrabbits have increased last few years. Many skunks now. / Jenkins knows country well + can fly me to sites on map to view or photo *Cynomys* towns. / Saw about 65 *Antilocapra* near C.P.E.R. / Williamson says that there are more or less relic grass areas in old sheep-dipping enclosures + in cemetery at Sligo (SE of Grover).

Camped at C.P.E.R. Set 4 snap traps near burrows.

January 19, 1955. Temp. -16½°C. last night. No catch in traps; *Dipodomys* probably hibernating. Rare mouse-like tracks on snow (old snow; the storm of Jan. 17 a.m. did not reach here.) I talked briefly with Mr. Prange, then for 2 hours each with A. Deporter & C. Aen of Rockport about *Cynomys* + other animals. Near Rockport ~~old~~ signs of Indian fires + tipees of long ago, said Deporter, who had been in this area 46 years. Formerly kit foxes, he said. He thought ferrets in holes in sandy ground, where kangaroo rats. He had seen weasels here - turn white winter. Skunks now a pest. Many badgers now. Deer first seen about 1928 (*O. hemionus*); now not uncommon on plains. Occasional ~~bad~~ blizzards here with snow that closes main roads for days. Blizzards in 1913,

Journal

January 19, 1955 Weld Co., Colorado

1920, 1935, 1949-50 (Jan. 1). On May 1, 1927, much snow & extreme cold. Thus, occasionally very severe, very early (once October), or very late winters or storms. In general winter not so cold as many years ago and planting season later. Visited C. C. Acor, another old resident of region. He had heavily overgrazed ½ section (?) ½ mile N. Rockport on W. side road. Many *L. townsendi*, *Sylvilagus auduboni*, *Cynomys* (burrows). Acor kept about 12 bison on his place. Mustached, no teeth, a great talker, but friendly; as reliable observer fair - at least no tall tales. | Deporter said formerly much more brush in this country; high as your head to S. of C.P.E.R. area. He claimed to have seen ferrets in past; Willard Frank too (but F. rather unreliable I think). / Drove to Jim Lawrence place SW of C.P.E.R. & looked at pasture with *Cynomys* burrows. Saw 2 *L. townsendi* at once there. / In Ft. Collins talked with Norton Miner, predator & rodent control man, in evening. He said that a former antelope refuge north of Waverly showed extreme bad land use. Bears had been problem last year, probably on account of shortage food in wild. Another trapper, Gleason, working in northern part of county, said to have taken more than 100 *Lynx rufus* that area. Sheepmen especially strong for coyote control, Miner said.

January 21, 1955 Ft. Collins, Colo.

Office work. Licensed pickup truck in Colo. Visited C. Till in Game & Fish Dept. office (Colorado Bldg.).

January 23, 1955. ~~At~~ Office work. Overcast. Visited *Cynomys* town near Fossil Creek in afternoon.

Journal

January 24, 1955 Larimer Co., Colorado.

Office work in morning. Light snow last night. Visited *Cynomys* towns near Wellington. Saw 1 *Circus*, 1 *Aquila*, 1 *Buteo lagopus*, many *Otocoris*. Drove across to Owl Creek & back to Ft. Collins.

January 25. Partly overcast; warm in afternoon (40°?) & no wind. Worked in bot. library morning. In afternoon visited *Cynomys* colony near town & saw some out. Snow melted much.

January 26, 1955. NE Larimer Co.

I drove from Ft. C. toward Laramie & investigated going colony 3 mi. WSW of Steamboat Rock. Talked with M. Ferree (owner), & Lloyd Halsten of Red Top Station about *Cynomys*. Shot 3 *Cynomys* for examination & saw more than 20 out. Partly overcast; about 35°F. max. temp. & moderate breeze. Returned to Ft. Collins for the night. Examined 3 carcasses *Cynomys*.

January 27, 1955. Ft. Collins, Colorado.

Examined droppings, coyote scats, hair, at Colo. A&M.

January 28, 1955 Nr. Loveland, Larimer Co., Colo.

Visited 2 *Cynomys* colonies near Loveland. Saw *Cynomys* out. Saw 1 *Circus hudsonius* but no eagles or *Buteos*. Saw cottontails but no *Lepus*. Saw several badger diggings. Nearly clear today but cold moderate breeze in afternoon. Guy Jordan ranch 6 mi. SW of Loveland good place for general rodent trapping.

January 29 NW Weld Co., Colo.

With family drove N. on highway 85, thence E. to Carr & Rockport. Briefly visited Acoi's bison ranch, then to C.P.E.R. Looked over two old *Cynomys* colonies, in vicinity & another

Journal

January 29, 1955. Nr. Ft. Collins, Larimer Co., Colo. near Pierce. Returned to Ft. Collins. Half overcast & moderate wind. About 40° F. max temp. I saw at least 3 *Aquila*, 2 *Buteo lagopus*, 1 *Circus hudsonius* in CPER area.

January 30, 1955 Spent most of day near *Cynomys* colony near town with live traps out. Saw up to 14 *Cynomys* at once but trapped none. 5/10 to all overcast, calm, temp. to about 45°F. (est.).

January 31, 1955. Departed Ft. Collins 8 a.m. with Victor Scheffer (Fish & Wildlife Service) and Ralph Hill (USFS, Denver). Drove via Cheyenne, Torrington, Lusk, Hot Springs, to Wind Cave National Park. Talked there with supt. Carl Semmingsen about mammal problems. Drove on to Custer & spent night there. On road from Cheyenne to Lusk we saw about 4 dead *Buteos* (*ferrugineus* ?), 1 *Mephitis*, 50± *Lepus*. Overcast but not freezing. Little snow on ground at Wind Cave Pk. Semmingsen told us that elk herd there had been reduced to 81, buffalo to 350?, last year. Some fences had been removed so animals can wander about. Near road behind Wind Cave Park mostly rolling prairie bordered by short yellow pines.

Feb. 1, 1955. Nr. Custer, S. Dakota
Interviewed George Barnes, trapper, concerning *Cynomys*. Spent afternoon with a U.S.F.S. group touring Black Hills. They have a beaver problem as many beavers, which destroy aspen (some paper birch & pine). Many beavers trapped out by Game & Fish Dept. men, but apparently not enough to keep down damage. Another

Journal

February 1, 1955 Black Hills, S. Dakota

problem is that of Mt. Goats. There are about 300 now, having built up from small introduction, but no provision for harvesting them, & some pressure for new introductions. Summer grazing is another problem, there not being enough for the livestock that is wintered on ranches out of the Black Hills national forest. Porcupine damage is heavy. One man told of a party killing 62 in one night. Thinning seemed to increase porcupine damage. Compared to yellow pine in Calif, the reproduction here excellent; young trees growing thickly like lodgepole pines in west, & mature trees not large (18" very big). Jack Kern, Forest Supervisor, was especially friendly & interested in my work.

February 2, 1955. Custer, S. Dakota

Interviewed Archie Howe, trapper. Then with Vic Scheffer went to Wind Cave Nat'l Pk. headquarters. With ranger Suter visited several prairie dog towns in afternoon. New snow lightly covering ground. Scheffer left for Ft. C.

February 3, 1955 Wind Cave National Park

Went out with park rangers to shoot a bull bison for Indians from Scottsbluff. Snowed about 4" last night & still snowing. A bison was wounded & ran. Ranger Suter & I trailed it for about an hour. When we gave up we were lost in snowstorm. After much wandering around we walked back to headquarters, arriving about 5 p.m. It snowed all day, but not cold. Snow at headquarters about 10" deep — dry & light. On our hike Suter & I saw several pinon jays.

Journal

February 3, 1955. Wind Cave Nat'l Park, S. Dakota
several elk, many bison, & a herd of 20± pronghorns; but no rabbits, prairie dogs, or other large mammals (one coyote track). Cleared in night.

February 4, 1955. Nearly clear but some fog clouds. I did office work at headquarters. Saw 3 mule deer out window (Both white-tailed & mule deer in Black Hills). Spent an hour near ~~C. l.~~ *Cynomys* towns near roads. Moderate wind; snow blown.

February 5, 1955. Nearly clear, mod wind. Some *Cynomys* out. Collected 1 ♂ for examination. Searched for carnivore tracks on C. l. towns. About 4 p.m. departed Wind Cave N. P. and drove via Hot Springs, Lusk, Cheyenne, to Ft. Collins.

February 7, 1955. Ft. Collins, Larimer Co., Colo.
Flu & cold developed so taking it easy. Got Hopwood of Colo. A & M., Zoo. Dept., started on project to study reprod. cycle of *Cynomys*. Visited Dr. List, Entomology Dept., concerning harvester ants.

February 8, 1955. Unusually warm – about 55°F. estimated – so much snow melted.

Feb. 9 Overcast afternoon. Strong wind. But not cold. Had long talk with Dave Crouch, F & WL trapper, of Brush.

February 11, 1955. About 3" snow night of ~~about~~ 9-10. Cold at night (10°F. est.). Partly overcast yesterday. Clear today & about 38°F. max. Spent midday inspecting snow tracks of *Cynomys* l., setting traps, photographing.

Journal

February 12, 1955. N. Ft. Collins, Colo.
Overcast, calm, cold (20°F. at 9 a.m.). Visited Spring Canyon Dam colony twice & Loveland (Lucy Jordan) colony of *Cynomys* once. No *Cynomys* taken in 9 steel traps left out for them. Warmer & some sun in afternoon. Mouse tracks, mouse (*Peromyscus maniculatus*) seen several places in *C. C.* colony.

February 13, 1955. Larimer Co., Colo.
Temps. to perhaps 55° during day; clear & calm. Much snow melting. Visited traps for *Cynomys* at 2 localities but none taken. Took up Loveland traps. Set 4 more on. Ft. Collins so 8 steels out for *Cynomys* there. Left 1·8×8' live trap out near active burrow. Saw Lewis woodpeckers (2) today, also linnet. *Buteo lagopus* fairly common.

February 14, 1955. Office work. Overcast morning, clear late afternoon, with temps. to 50°F. Set 2 more *Cynomys* traps so 10 out. No catch.

February 15, 1955. Half overcast, increasingly cloudy. About 40°F. max. Drove to *Cynomys* colony near the Forks. Shot 3, lost 3 wounded, & saw many. One taken in steel trap near Ft. Collins. Ft. Collins, Colo.

Feb. 16, 1955. Examined carcasses. Trapped 2 more ~~at~~ ~~at~~ *Cynomys* near town. Clear warm day.

Feb. 17, 1955. Denver, Colo.
Drove to Denver. Visited Penfold of Izaak Walton League & Fish & Wildlife Lab. men at Federal Center. Returned to Ft. Collins. Half overcast but fairly warm (60±°F) today.

Journal

February 18, 1955 Nr. Ft. Collins, Colo.
Snowing all day. 10-20° F. Snow about 5" deep.

Feb. 19 Overcast. Snowed lightly. Cold.

Feb. 20. Nearly clear but cold wind. Snow windpacked.

Feb. 21 Cold wind & 1/5 overcast (cirrus). Below freezing all day. Visited Spring Canyon Dam *Cynomys* colony twice.

Feb. 22. Clear a.m., overcast p.m. Cool but sunny until 2 p.m. Trapped 1 *Cynomys ludovicianus*. Reset some of 10 traps out & put out 4 additional. Examined trapped one.

Feb. 23. Lightly snowing but occas. sunshine and temperatures to 30° C. Visited *Cynomys* colony. Tracks of one.

Feb. 24. Clear, calm, but cold, & 2" snow on ground. 6° F. at 8 a.m. Visited *Cynomys* colony & watched from 8:45 – noon. Fairly sure tracks weasel at this colony.

February 25. Watched *Cynomys* colony 9:30-11:30. Trapped ♂ 12. Thin clouds; sunny & warm for season. Much melting of snow. Examined ♂ 12.

February 26. Stratus overcast & temp. about freezing. Short visit to same *Cynomys* colony.

February 27. Stratus clouds; hoar frost; a few snowflakes. Cleared up noon & then warm (40° F.). Visited *Cynomys* colony & took ♂ 13 from trap.

February 28, 1955. Office work. Clear & warm, wind in afternoon. Traps held 4 *Cynomys* including large ♀♀. Set 2 additional traps. Examined specimens.

March 1, 1955 Larimer & Weld Cos., Colo.
Drove to Wellington & photographed *Cynomys*. 50° F. or to-

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March 1, 1955 Weld & Larimer Cos., Colo.
day & strong W. wind. Visited Cynomys colony at CPER and found much activity there. Traps near Ft. Collins held 3 Cynomys. Examined these. Much snow melting today. I saw 2 Circus ~~[illegible]~~ near Wellington but no Buteo during day.

March 2. Nr. Ft. Collins, Colo.
Clear a.m.; overcast p.m., but warm (~~50~~ 58°F.). Took 3 Cynomys ludovicianus in steel traps (♂ 23, ♀♀ 21 & 22) and examined these. Paul Baldwin, & a student, Joe Hopwood, are helping much with examination of carcasses for reproductive info.

March 3. Clear in morning, then half overcast, & rather warm (50°+). Visited Cynomys ghost town in foot Buckhorn Canyon. Ran trap line Spring Canyon Dam 11:30; at 4 p.m. covered traps up (so not available to Cynomys). Caught ♀ 24. Visited Dean Wasser, Range Mgt. dept., Colo. A & M.

March 4, 1955 N. Larimer Co., Colo.
With Paul Baldwin, Richard Hansen, Joe Hopwood, drove N. to Antelope Refuge & near Wyoming line. Visited two Cynomys towns. Saw 3 Buteo (lagopus or ferrug.) on Ackerman ranch, also, 3 Odocoileus, 8 Antilocapra, 5+ Aquila. Saw 5 crows between Ft. Collins & Waverly. Visited Rody Ackerman briefly & Clarence Munro ranch.

March 5, 1955. Nr. Ft. Collins, Colo.
About 2" snow last night & about 12°F. min. temp. Half overcast. Lab & library work. Visited Spring Canyon Dam colony.

March 6 N. Larimer Co., Colo.
Visited Torry ~~Faun~~ Roman ranch 3 mi. W. of Norfolk. Saw many large old Cynomys mounds. Many Pogonomyrmex mounds too. Saw 2 Aquila. Visited 3 old eagle nests. Saw

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March 6, 1955. N. Larimer Co., Colo.

two *Bubo virginianus* flush from same small hole in cliff. Many sticks + *Cercocarpus* leaves in it + a few casts but no eggs. Shot 2 prairie dogs + saw others near farmer's houses. Horned larks common. Found 1 grasshopper out + saw 1 ~~true bug~~ Hemiptera. ~~Updated~~ March 4 Baldwin took a Mt. bluebird in N. Larimer Co. in plains. It had grasshopper + several other insects inside. Half overcast alto-stratus but probably about 40°F. midday. Many *Neotoma* nests in conglomerate cliffs. Apparently these rats had chewed bark from *Cercocarpus* (much growing on steep banks below cliffs) + cut branches to 1/2" diam. Eagles had bare many dry old *Yucca* clumps in nests. Many rabbit Lepus bones near old nests. // at Wellington I heard local men telling each other that they had used an especially great amt. of coal & wood for heating this winter.

March 7, 1955 Nr. Ft. Collins, Colo.

Visited local *Cynomys lud.* colony about 8 a.m. Office & lab work. Then talked with George Pass, rancher, + worked at mapping one *Cynomys* colony. Clear, calm + warm today - most plas out this year. I saw bees + a *Coccinelid* beetle + a true bug + some diptera. // Note: Slopes measured to now with clinometer were in degrees, not %.

March 8, 1955 NW Weld Co., Colo.

Visited *Cynomys* colony near Wellington, then Sec. 22 colony near CPER. Set 15 live traps at latter. Many *Cynomys* out. Probably warmest day of the year. Cirro-stratus partial over-cast. Strong dust-raising W. wind in late afternoon. I saw two *Circus* at Wellington area + one other. In all saw 3 *Buteos* + 2 *Aquila* during day. Many sparrows of different kinds at Wellington preserve. Horned lark most common bird on plains.

Journal

March 9, 1955 NW Weld Co., Colo.

No catch in live traps in Sec. 22 *Cynomys* colony. I watched there an hour, then visited 2 poisoned out colonies, returned to Sec. 22, closed traps, & returned to Ft. Collins. Today saw near CPER two *Aquila*, two *Circus*, 2 *Buteo lagopus* or *ferrug.*, 1 *Falco mexicanus*. Picked up carnivore droppings on colony for search for *Cynomys* remains. Increasing cloudiness during day but fairly warm (16°F. at 11 a.m.) & very dry. Strong wind in late afternoon.

March 10, 1955 Nr. Ft. Collins, Colo.

Overcast & windy in morning. Very strong wind, about 50 mph, in afternoon, but clearing. In evening reset traps at Spring Canyon Dam colony. Found Cynomys ♂ 29, ♀ 30, ♂ 31 in traps, my covering cow chips having blown off.

March 11, 1955. Examined specimens. Caught 2 additional *Cynomys* in steel traps & examined them. Clear & 50°± today but strong winds.

March 12, 1955 Steel traps held 2 *Cynomys ludovicianus*. Visited colony near Wellington in afternoon. Many tree sparrows and female redwinged blackbirds there; also 3 *Circus*, 1 *Corvus brachy.* — Weather Mod. wind, few clouds, warm.

March 13, 1955. NW Weld Co., Colo.

Visited *Cynomys* colony at C.P.E.R. & started mapping. Saw 2 *Aquila*, 2 *Buteo lagopus* or *ferrugineus* in vicinity. Half overcast, mod. breeze, ~~comparatively~~ comparatively warm. Dry farmed wheat fields near Nunn & some pastures near Ft. Collins now show greenish aspect due to new growth. Insects now fairly common.

March 14, 1955 Nr. Ft. Collins, Colo.

Visited Spring Canyon Dam colony & took 2 ♀ *Cynomys lud.* in traps.

Journal

March 14, 1955 Nr. Ft. Collins, Colo.

Examined specimens. Clear in morning but overcast, cold, & light snow in afternoon. ~~Light~~ Cogswellia shoots to 1" above ground now.

March 15, 1955. Light fall of wet snow all day, but calm. Result of storm was 7" snow, = .6" water, this area; most water of any storm this season.

March 16, 1955. Overcast most of day but nearly clear 11-1 p.m. & much melting of snow. Searched for Cynomys tracks, staked used burrows, ~~photographed~~ tracks in snow.

March 17, 1955 Clear morning but overcast & light snow afternoon. Visited Wellington Cynomys colony & Spring Canyon Dam colony.

March 18, 1955 N. Larimer & NW Weld Co., Colo.

Visited colony 9 mi. N. Waverly & shot 5 Cynomys ludovicianus. Shot one in separate colony. Set 15 live traps at CPER colony & observed briefly there. Returned to Ft. Collins, checked traps at Spring Canyon Dam & unset them; Warm clear day & nearly calm.

March 19, 1955 Ft. Collins, & CPER, Weld Co., Colo.

Examined specimens until noon. In afternoon checked & shut live traps at CPER Cynomys colony. Baldwin collected 3 juncos & a tree sparrow at CPER. Saw Falco sparverius, Buteo lagopus, many Otocoris. At one site came on 4 Lepus townsendi together.

March 20, 1955 Snow last night & lightly all day, rather wet, to about 3" deep (7½" ~~total~~ in storm, at Ft. C.). Examined carcasses & bones.

March 21, 1955 To Denver, Colo.

Clear but cold (4°F. at 8 a.m. in Ft. C.; −6°F. min. at night). Drove to Boulder & talked with Hugo Rodeck & Paul Maslin, getting most information from Maslin. Then drove to Denver & stayed at motel west of city.

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March 22, 1955 Denver, Colo.

At Denver Research Lab of F & W Service I worked on stomach & scat examinations with help of Charles Sperry, & talked with Neff, Robinson, Spencer, & others. Then returned to Ft. Collins.

March 23, 1955 Ft. Collins, Colo.

About 1" snow on ground this morning but sky half clear. Snow melted during day. Visited V. Scheffer, & Mr. Gardner of U.S.F.S.

March 25, 1955 About 3" of snow fell today. Cold last night (below 0) & cold all day (<20°F.) with light wind. Visited *Cynomys* colony in afternoon.

March 26, 1955 Warmer & much snow melting. Office & lab work. Visited local *Cynomys* colony in afternoon.

March 27, 1955 NW Weld Co., Colo.

Clear & calm but cool. Visited CPER colony, examined tracks in snow, continued mapping. Nr. Ft. Collins, Colo.

March 28, 1955. Mapped Spring Canyon Dam *Cynomys* colony. Clear & cool in morning, overcast & warmer afternoon.

March 29, 1955. Overcast but fairly warm; some sunshine. Worked on vegetation at Spring Canyon Dam colony with help of Robert Gardner of USFS. Laid out Parker transect & ran paced transect. Visited colony on Fossil Creek 6 mi. SSW of Ft. Collins, SW1/4 Sec. 3. Set 9 steel traps.

March 30, 1955. Talked with John Retzer, Dean Clinton Wasser, Vic Scheffer. Took 3 *Cynomys* from traps. Completed maps, colony. Took 2 photos of colony. Examined specimens. Jos. Hopwood, student at Colo. A & M, starting work on repro cycle of *Cynomys lud*.

March 31, 1955. At Spring Canyon Dam *Cynomys* colony took ~~50 at~~ #50 at 11 a.m., ♀51, ♂52 at 5 p.m. Strong wind & overcast morning; clearing & less wind afternoon. Temp. to about 45°F. Saw *Cogswellia* in flower today – 2" high.

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April 1, 1955 Nr. Ft. Collins, Colo.

Clear, mod. wind, & temps. to over 60°F. At Spring Canyon Dam colony, I took up all traps. Visited another colony on Fossil Creek & set 7 traps.

April 2, 1955. Warm but partly overcast, increasing in p.m. Spent midday at CPER, mapping *Cynomys* colony. Wind about 30 mph from E. there at 3 p.m., but warm & entirely overcast. One forb (*Capsella*?) now above surface [illegible], a few cotyledons showing near water, but no greenery visible in grid. In region many tractors out ploughing, harrowing, planting with seed drills.

April 3, 1955 Overcast. Strong winds. Storms in Wyoming reported, with over 1 ft. snow in Sheridan, & in Salt Lake City.

April 4, 1955 S. Wyoming.

With Sue started for Symposium on disease transmission in native mammals, to be given at Dugway Proving Ground, Utah, by Univ. Utah and Army. Departed 10 a.m. from Ft. C. At Laramie visited briefly with Reed Fautin. Traveled Highway 30 to W. via Medicine Bow, Rawlins, & Rock Springs, where we stayed. Strong wind, snowing, & poor driving conditions.

April 5, 1955 NE Utah

Fair weather. Drove to Ogden. Found Lincoln Ellison out. Continued on to Salt Lake City. In evening drove to Tooele, about 30 miles from Dugway, & stayed for night.

April 6, 1955 Dugway, Utah.

Listened to papers of symposium. Visited with E. R. Hall, Henry Fitch, V. E. Shelford, H. L. Shantz, S. Flowers, & others. Same on April 7.

April 8, 1955. Field trips in morning on desert flats where *Atriplex*, *Sarcobatus*. Saw 1 *Aquila*, 1 *Falco mexicanus*.

Koford

Journal

April 8, 1955 NE Utah

Departed early p.m. & drove to Vernal, Utah.

April 9, 1955 Drove via highway 40 to Craig, Steamboat Springs, Berthoud Pass, Golden, Boulder, Ft. Collins. Much snow in Berthoud area but almost none ~~disappeared rapidly~~ a few thousand feet lower. Very dry appearing in area of Golden. Arrived Ft. C. 9 p.m.

April 10, 1955 Ft. Collins, Colo. C

Calm, warm, clear until 70° + F. max. mid-afternoon. Easter Sunday.

April 11, 1955. Overcast in morning, snowed in afternoon. Visited CPER with Klipple & borrowed fencing materials. Hard wind with snow.

April 12, 1955 Ft. Collins, Colo.

About 4" wet snow on ground. Storm morning, cleared afternoon. Office work.

April 13, 1955. E. Larimer & W. Weld Co., Colo.

Visited Wellington colony. Speotyto c. now in burrows there. Circus (at least 2 (1♂) hunting this area. Saw 1 Citellus 13-lineatus there. Richard Hanson said he saw some Wellington area April 3. ~~Set~~ Took 2 C. l. in steel traps + 1 in live trap there today. || Fairly warm, slightly cloudy. Snow drifts common & much melting. Visited James Lawrence ranch. He had lost several calves in storm. || At Sec. 22 CPER colony I trapped 1 for exam. ~~St~~ Set up one exclosure & laid out another. || Saw 2 eagles during day; one near for Lawrence place, one near Harry Prange place. Returned to Ft. Collins. Met Game & Fish ~~was~~ man Hoover who told me of Cynomys towns this region.

N.E. Larimer Co., Colo.

April 14, 1955. Warm & partly overcast. Strong wind in afternoon. Mapped at Wellington Cynomys colony. Talked with Mr. Gross of Wellington.

April 15, 1955. Warm, dry, 2/10 overcast (cu). Visited Sec. 23 Cynomys colony & set 12 steel traps. Took photographs. ~~It~~

April 16, 1955 5/10 to 8/10 overcast; cool until mid-afternoon. Took 4 Cynomys in traps. Completed exclosure on CPER Cynomys colony.

Koford

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April 16, 1955.   NW Weld Co., Colo.

Saw no eagles or Buteos. One apparent accipiter (5 mi. N. Waverly). Took one Uta on CPER, Sec. 22. Green grass in spots to 1½" long leaves on CPER ranges. Pools water where snow melted. Few small spots snow remain.

~~Nr~~ Ft. Collins, Colo.

April 17, 1955 Clear warm day. Office work.

April 18, 1955. 2/10 cumulus. Visited 2 Cynomys colonies near Ft. Collins. Set 5 traps on one. Shot one Cynomys. Grass to 4" tall & several kinds forbs with leaves now in rolling range near town. Photoed range conditions & burrows.

April 19, 1955. Took one Cynomys in traps. Overcast & very strong wind today - worst of year in some areas. Much blowing dust on plains. Office work

April 20, 1955 Mapped Wellington Cynomys colony. Took one ♀ Cynomys there. Set 10 live + 2 steel traps & 15 snap traps at CPER colony. Warm, partly overcast, mod. wind. [illegible] Saw 4 Circus at once near Wellington. Several Speotyto now established in Cynomys colony near Wellington. Saw 4 crows near Wellington.

April 21, 1955   NE Larimer & NW Weld Cos., Colo.

With Victor Scheffer & John Retzer visited 7 Cynomys colonies to survey soil factors in relation to distribution. During day saw 1 Falco mexicanus near Nunn. Calm & mod. temperature, overcast in afternoon. Saw several Lepus townsendi, & an Otocoris apparently feigning injury. Found half built nest (of Otocoris?) 10 mi. N. Waverly.

April 22, 1955 Mapped at CPER Cynomys colony. Then set 14 steel traps for Cynomys about 10 mi. N. Waverly. Partly overcast but warm. Saw probable Curlew near Waverly, 4 mourning doves near Carr. Attended Colo-Wyoming genetics seminar at Boulder in evening.

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April 23, 1955 Larimer Co., Colo.

Very strong wind. Much blowing dust. Took 4 Cynomys from steel traps. Office work.

April 24, 1955. Visited colony near Loveland. Talked with James Cole at Estes Park. Cloudy but not cold.

April 25, 1955 Partly cloudy, mod. wind, not cold. Took up Cynomys traps N. of Waverly, taking 2 animals, & shot 2 more in area.

Nr. Ft. Collins, Colo.

April 26, 1955. Observed Cynomys on wheat field. Shot two. Examined carcasses to date. Saw 1 Buteo borealis.

April 27, 1955 Albany Co., Wyoming.

Visited Cynomys leucurus colony near Sheep Mtn., 20 mi. W. of Laramie, & observed mounds there with Victor Scheffer and John Retzer. Talked with Richard Hurd, Wm. Laycock, and Alan Beetle, range men of Univ. Wyoming at Laramie. Windy & overcast. Light snow near Sheep Mtn.

April 28, 1955 Nr. Ft. Collins, Colo.

Investigated Cynomys in wheat field. Shot 3. Set 7 steel traps in wheat field. Examined carcasses. Very windy morning, calmer & overcast p.m.

April 29, 1955

Took 2 Cynomys in steel traps. Spent midday mapping at CPER. Windy, overcast, but warm. Much dust in air. I saw a Pipilo maculatus at CPER, near fence on open range. Near Nunn saw 2 apparent swainson hawks. Leucocrinum flowering ~~no~~ near Ft. Collins ~~now~~.

Ft. Collins & Greeley, Colo.

April 30, 1955. Shot 2 Cynomys ♂♂ near Ft. Collins. Took a baby Peromyscus maniculatus in live traps set by Chrysothamnus bush in Cynomys colony area. Spent midday at Greeley, at Colorado-Wyoming Acad. Sci. meeting. Checked 3 steel traps evening; no catch.

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May 1, 1955 Nr. Ft. Collins, Colo.

~~Shot two~~ Trapped *Cynomys* (♂83) near Ft. Collins. Took up traps in wheat ~~field~~ field. Examined specimens. Larimer Co., Colo.

May 2, 1955. Took up 3 traps & reset 4 near county dumps. Drove to Ackerman's, about 10 mi. N. Ft. Collins, & set 14 steel traps in Sec. 10. Shot ♂84 (*Cynomys*) there. Set 2 live traps & 2 snaps near *Atriplex* in same area. Windy & overcast; wind very strong in mid-afternoon. Checked 4 local traps; none sprung by 5:30 p.m.

May 3, 1955 4 local traps held 1 *Sylvilagus* & 1 lost. Spent forenoon in conference on pocket gopher project with V. Scheffer, Albert Reid, Paul Hickey, Marvin Hoover, & C. Terrill. Colo. legislature has appropriated $ $ for gopher research. Fish & Wildlife may also get funds. // Partly overcast but very windy. In afternoon checked 14 traps 9 mi. N. of Waverly & took 11 *Cynomys* from them. Reset traps. Saw one *Phrynosoma* there. Yesterday *Otocoris* nest there (incomplete Apr. 27) had 2 eggs.

May 4, 1955 4 traps nr. Ft. Collins held no *Cynomys*. Set 6 in same colony. // Visited *Cynomys* colony 9 mi. N. Waverly & took up 14 traps, taking ♂99. ~~in same trap where one ( ) taken yesterday. Three others sprung~~. I shot two others (♂98, ♀97), at about 70 yds. range. Some large mounds had on surface several small burrows or diggings, as by *Dipodomys*. I saw no *Citellus* in area. Many mouse tracks south on burrow. At least 15 apparently badger dug burrows found (how long ago? - perhaps last fall). Several burrows in or next to ant mounds. One angled under mound that still had active group of ants. General cover of area *Buchloe dactyloides* (especially lower flatter sites), *Muhlenbergia*, *Bouteloua gracilis*, with much *Atriplex canes-*

Journal

May 4, 1955 Larimer Co., Colo.

Several horned larks on colony, but no other birds seen. Near Ft. Collins I saw one *Cathartes aura*. Examined specimens, as yesterday, 1 *Dipodomys ordii* taken in 4 traps set for them near *Atriplex*.

May 5, 1955 Six traps near Ft. Collins held one *Cynomys*. Mapped at CPER colony & shot a ♀ there. Warm & calm today but overcast. Saw 1 *Uta* at CPER.

May 6, 1955 Nr. Ft. Collins, Colo.

Strong winds & partly overcast. Ronald Smith visited from Boulder (grad student) & I showed him local *Cynomys* study area. In afternoon toured local colonies with C.H. Wasser, range man of Colo. A & M. Trapped 1 *Cynomys*, shot another. Took a *Sylvilagus* in one trap (testis 30 mm. long). Strong wind all day.

May 7, 1955. Local traps held 0 *Cynomys*. Partly overcast.

May 8, 1935. Local traps held 1 *Cynomys*. Examined specimens taken to date. Overcast with short light showers.

May 9, 1955. Took 2 *Cynomys* from traps & shot 3. Overcast with light *rain* in late afternoon. Examined specimens.

May 10, 1955. Took up traps. Shot 2 *Cynomys*. Watched colony near Wellington in afternoon.

May 11, 1955. Watched Wellington colony. Shot one *Cynomys*. Clear but 25 mph wind.

May 12, 1955. Partly overcast, little wind. Office work.

Larimer & Weld. Cos., Colo.

May 13, 1955. Visited Wellington *Cynomys* colony & saw one group juveniles out. Two apparent *Buteo ferruginea* & 2 marsh hawks there, latter hunting over cattail area. At CPER colony, put in & marked stakes. Shot one *Cynomys* for examination. Set live traps. Saw 1 *Crotalus* in *Cynomys* burrow (first seen this season). Warm & partly overcast.

Journal

May 14, 1955 Weld Co., Colo.

Watched *Cynomys* at CPER in morning. Many lark buntings in flocks on range + perched on fences; ♂♂ + ♀♀. I also saw a few single McCown's longspurs. When descending to feed, glide down with wings held ⌒ and tail spread. ~~Have~~ Saw a mountain plover walking near road near CPER, + have seen one in area on previous occasions. Two Swainson(?) hawks about 2 mi. W. of Nunn, where seen before; a ~~p~~ nest (of these?) in cottonwood nearby. Saw a baby *Phrynosoma douglasii* on sec. 22, + a *Citellus 13-lineatus* near *Cynomys* colony. Calm + overcast morning; strong wind + dusty afternoon. Visited Acor ranch near Rockport + collected *Cynomys*. Buds now forming on *Opuntia* leaves.

May 15, 1955. Ft. Collins, Colo.

Clear but very strong wind. Probably 40-50 mph on plains.

Weld Co., Colo.

May 16, 1955. 5/10 overcast morning. Visited CPER colony in afternoon. McCown's longspur, mtn. plover, lark buntings, horned larks seen there. Swainson hawks 3 mi. W of Nunn have half-built nest in isolated cottonwood tree. Casts below nest have fur, mouse bones, grasshopper parts. At Acor ranch shot 2 *Cynomys*. Rain in late afternoon. Cold evening. Larimer Co, Colo.

May 17, 1955. Visited 3 local *Cynomys* colonies to look for young. Put up exclosure in Wellington preserve colony.

May 18, 1955. To Hot Springs, S. Dakota.

Departed 9 a.m. + drove from Ft. Collins via Cheyenne + Torrington, Wyo., to Hot Springs, S. Dakota, arriving about 6 p.m. Compared to plains of N. Colo, Wyo. + S. Dak. green, + beyond Torrington, grass had mixed-prairie appearance. I saw 2 Swainson hawks along the way. Spent evening talking with James Cole, Biologist of N.P.S.

Journal

May 18, 1955 Wind Cave N.P., S. Dakota.

At Wind Cave National Park, Supt. Demengsen told me that it had not snowed since my visit in Feb. About an inch of rain fell ~~Fo~~ May 16.

May 19, 1955. Spent day with James Cole viewing Cynomys towns in park. Saw no groups young out. Vegetation well-developed & green so that areas denuded by C. l. conspicuous. Saw no hawks or predators all day, tho Cole saw 1 badger yesterday.

May 20, 1955. To Medora, N. Dakota.

Cole & I drove via Newcastle & Sundance, Wyo, to Devils ~~Tower~~ Tower Nat'l Monument. Viewed Cynomys town there. This is edge of Black Hills ~~&~~ on Belle Fourche River in ponderosa pine zone. Cattle ranches in surrounding zone. Drove then to Belle Fourche & N. to Bowman & Bellfield, then to headquarters of Theodore Roosevelt Nat'l Monument. Little wildlife save an occasional Lepus or Citellus seen until near Bowman, then many Lepus & pheasants by road. Lark buntings seen from time to time. We talked with Supt. & Mr. Brooks, & stayed for the night.

May 21, 1955 Theo. Roosevelt N.P., Medora, S. Dak.

With ranger Bob Morey, Cole & I visited several Cynomys colonies. In afternoon ran range transects with Loren Potter & students. Dinner with Chester Brooks & family. Warm & rather humid. Mosquitoes are a nuisance. Saw an eaglet in nest. Saw two half-grown Bubo virginianus in nest. Black widow spiders in Cynomys burrows.

May 22, 1955. All overcast & cool. Light rain most of day. Visited Cynomys colonies. Saw pair pigeon hawks that apparently had nest in an old Pica nest. Crows & Pica seen. Marsh hawk seen. Saw 15± sharp-tailed grouse in thick wheatgrass areas during day. Saw white-tailed deer, antelope, in park.

Journal

May 23, 1955 Medora, S. Dakota.

Overcast, but clearing p.m. With Jim Cole visited *Cynomys* towns in TRNMP. Shot 6 for examination. Saw a nest of long-eared *Asio* with two large half-downy young. Nest on stick nest 12' above ground in Boxelder grove in bottom. Two adults present. One sometimes perched on ground & seemed to feign injury. Near Government Creek saw a killdeer injury feigning, but found no nest. ~~to~~ Bob Morey found *Sturna neglecta* nest with young.

May 24, 1955. Rain started early morning & continued intermittently all day. Examined carcasses. To Wind Cave N.P., ~~to~~ Hot Springs, S. Dakota

May 25, 1955. Rain again. I drove S. via Spearfish & Deadwood, to Custer & Wind Cave N.P. Overcast & sprinkling all day.

May 26, 1955. To Ft. Collins, Colo.

More rain & overcast. Drove via Lusk & Torrington to Ft. Collins.

May 27, 28 - strong winds at Ft. Collins. Office work.

May 29, 1955. Visited Spring Canyon *Cynomys* town. Counted dogs, Noted vegetation, burrows. Nr. Ft. Collins, Colo.

May 30, 1955. Counted *Cynomys* & new litters juvs. in towns near Ft. Collins. Saw Swainson hawk, Turkey vulture.

May 31, 1955. Counted *Cynomys* in towns near Ft. Collins. Shot 1♂. 30 mph wind in afternoon

June 1, 1955. Nr. Wellington, Colo.

Made counts litters at Wellington *Cynomys* colonies. Trapped two ad. females & a juv. (kept as pet, ♂). 30 mph wind. Thundershower p.m.

June 2, 1955. Had cold. Stayed home at *Ft. Collins*. In after- ~~In~~ noon thunderstorm with hard hail, many stones size of walnuts. Hail ripped many green leaves from trees, which littered streets. In soft ground ~~hole~~ hail made holes an inch deep.

June 3, 1955. Half overcast, 20 mph wind. Counted *Cynomys* at local colonies.

10 – To we
11 – RC + DT
2 – DT

Journal

June 4, 1955 Ft. Collins, Colorado.

Rain started early morning & continued most of day.

June 5, 1955 With Joe Hopwood visited *Cynomys* colony and fox den. Found lark sparrow with 4 eggs on ground under edge bush on slope shallow grassy draw

June 6, 1955. To Boulder, Colo.

Drove to Boulder. Visited E.R. Kalmbach. Worked in library.

June 7, 1955 Larimer & Weld Cos, Colo.

Counted *Cynomys* at Wellington preserve & CPER colony. Saw Vesper sparrows at CPER, & one Mountain Plover Clear & warm morning, 9/10 cumulo-stratus by 5 p.m. Ft. Collins, Colo.

June 8, 1955. Light rain in morning & totally overcast, Office work.

June 9, 1955. 1/10 cumulus, strong wind (30 mph) at Ft. Collins.

~~June 10, 1955~~ Overcast, strong wind, light rain. Drove with family via Cheyenne to Hot Springs, S. Dakota.

June 10, 1955 Still overcast, raining lightly. Explored roads in Wind Cave Nat'l Park, then drove via Custer State Park to Rapid City.

June 11, 1955. Saturday. Visited Leslie Allen of SCS, & arranged for assistance in range analyses. Then drove via Deadwood to Devil's Tower, Wyoming, to work on *Cynomys* town.

June 12, 1955. Devil's Tower, Wyoming.

Made extensive survey *Cynomys* town & went over N.P.S. files here. Overcast but no rain, clearing in late afternoon.

June 13, 1955 Started mapping outline *Cynomys* town. Took 12 photos of *Cynomys*. Visited briefly with SCS man Dickson from Hulett. Overcast early morning, clearing midday, overcast p.m. Mosquitoes bothersome in afternoon.

June 14, 1955. Photographed *Cynomys*. Completed map colony. Went

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June 14, 1955 Devil's Tower, NE Wyoming

over colony with George A. Dickson, S.C.S., Hulett, Wyo. Clear & sunny a.m., clouding p.m. Windy evening. Robin, grey jay, grey-headed junco, flicker, red-headed woodpecker, & other birds seen. Probable *Falco* ~~sp~~ *mex.* or *pereg.* at S. side base tower. TO nr. Deadwood, S. Dak.

June 15, 1955 5/10 overcast, warm, calm, at 8 a.m. Put up exclosure. Collected plants on *Cynomys* mounds. Examined vegetation & photoed. Thunderstorm noon, very heavy rain mid-afternoon. We departed & drove toward Wind Cave N.P. Stopped S. of Deadwood.

June 16, 1955 To Wind Cave N. Park, S. Dak.

Drove to Wind Cave, Spent afternoon going over King Cynomys area & orienting myself. Heavy thunderstorm & hail in evening tho warm & mostly clear in day. Found eagle nest with nearly grown eaglet in Shirttail Canyon. Found apparent *Marmota* skull this canyon. Saw at least 3 live & 2 dead marmots on road between Deadwood & Hill City.

June 17, 1955. Rain in morning. Visited Shirttail colony p.m. Saw 2 coyotes on *Cynomys* town. Heard young *Pica* in nest. Clearing evening.

June 18, 1955, Clear 8 a.m. but clouding up. ~~tt~~ With Lee Albee of S.C.S. visited *Cynomys* town for preliminary survey. Rain in afternoon. Saw 2 coyotes in Shirttail Canyon & heard at least 3 in evening.

June 19, 1955. Counted *Cynomys* on Shirttail town. Clear day with dry wind from W. Heard coyotes. Found 3 fairly well feathered *Pica* in nest in pine tree. Saw many mourning doves, killdeer, robins, & one robin-like thrush with speckled breast. Saw a falcon pursue a plover (not killdeer) thru several dives, unsuccessful. Saw a badger in *Cynomys* town. Clear evening. In clear warm daylight I saw a nighthawk, apparently feeding in air, in Shirttail Canyon.

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June 20, 1955 Wind Cave Nat'l Park, S. Dak.

Clear, dry, & at midday windy. Counted Cynomys. Trapped & examined ~~two~~ two. Visited vicinity eagle nest. Photographed. Saw 2 badgers. Near cliff of eagle nest many violet-green swallows & white-throated swifts.

June 21, 1955 Made counts Cynomys. Visited some other colonies in park & staked out census areas. Thunderstorm in afternoon, with rain & some hail.

June 22, 1955 To Ft. Collins, Colo.

Drove via Torrington to Ft. Collins. On way to Lusk, much tall Melilotus in yellow flower along roadbanks. Stipa comata now headed out & conspicuous along right-of-way.

June 23, 1955. Office work. Warm day. Thundershowers p.m.

June 24, 1955. Made counts & ground surveys some local colonies. All overcast, warm & calm, by noon. Found nest of mourning dove on ground near brush on rocky hillside. Two young covered with feathers.

June 25, 1955. Continued counts & inspection local colonies. Warm day, overcast. Rain evening. NW Weld Co., Colo.

June 26, 1955. Visited CPER Cynomys colony. Counted dogs, inspected town, staked new burrows. Warm, overcast, with sprinkle in mid-afternoon. Saw 2 Swainson hawks near Wellington. Nest near Nunn shows no recent activity, but piece of eggshell on ground below. 30 mph wind on plains late afternoon.

June 27, 1955. Warm, partly overcast, calm. Buchloe & Bouteloua now bear heads on seedstalks; Agropyron smithii rarely has heads now. Sphaeralcea & Opuntia in full bloom. Office work. In late afternoon visited barley field colony S. of Ft. Collins.

June 28, 1955 To Fraser, Colo.

Departed Ft. Collins 7 a.m. with Victor Scheffer, F& wildlife bureau, & drove to Denver. Talked with Robinson, Welch, & visitor David E.

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June 28, 1955 To Fraser, Colorado

Davis. Then we drove on to Fraser, where there is a USFS Experimental Forest. Looked at meadows along Louis Creek, observing *Thomomys* sign & looking for study areas. This area a spruce forest, with some areas lodgepole pine, & fine streams running through it. Good place for biological studies with USFS cooperation. Stayed overnight at Fraser. We found two junco nests there on ground at foot low shrubs; each had 4 eggs, apparently fresh. Canada jay seen, russet-backed (?) thrush heard. Fraser generally has lowest winter temperatures recorded in Colorado.

June 29, 1955 To nr. Grand Junction, Colo.

With Schaffer continued on to Grand Junction, then visited experimental range area in Badger Draw, about 22 mi. W. & 13 N. of G.J. Saw there many *Cynomys* ~~ludovicianus~~ *leucurus*, a few cottontails, on sandy loam soils in open shadscale (& other shrub) community. Camped at Colo. Nat'l Monument, where many high red ~~[illegible]~~ sandstone cliffs, similar to those at Capitol Reef, SE Utah. White-throated swifts, chipmunks there. Juniper-pinyon area. To Black Mesa, SW Colorado.

June 30, 1955 We drove on to Montrose & talked with rodent control men, then on to Black Mesa & ~~[illegible]~~ went over a prospective rodent study area where range experiments were already in progress. Spruce-fir forest with Thurber-fescue wide open grasslands here.

July 1, 1955. We drove down to Gunnison, thence east over Monarch Pass, then N. to Trout Creek Pass & camped. Ponderosa pine there in open stand at about 9000 ft., & very dry. Many open *Thomomys* holes, perhaps used now by small *Citellus*. With 3 live traps I took 2 *Peromyscus* ~~maniculatus~~ in an hour, 2 more by morning, so numerous. Dry *Bouteloua* gracilis here.

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July 2, 1955 To Ft. Collins, Colo.

Visited Fairplay & Hartsel, South Park, & made inquiries about *Cynomys* history. Saw many *Citellus elegans* here. Very dry short grass, much of it *Bouteloua gracilis*. One man of 30 years residence said ~~it~~ range was ~~dry~~ driest he had ever seen now. July was usually wettest month of growing season, however. He said he had heard ~~that~~ *C. elegans* formerly not present but had gradually invaded over Hoosier pass long ago (30 yrs. + ?). Well kept ranches (cattle, sheep, hay) in S. Park, probably because of proximity to Denver. Drove on to Ft. Collins. Hot there & rather humid there, overcast in late afternoon.

July 3, 1955 Ft. Collins, Colo.

Clear, warm. Office jobs. Overcast & thunder afternoon.

July 4, 1955 Wellington, Colo.

Spent morning at Wellington colonies. Hot, calm, clear, clouding in afternoon. Sultry in Ft. Collins. Ft. Collins, Colo

July 5, 1955 Correspondence & office work. Overcast p.m.

July 6, 1955. N. of Waverly, Colo.

Spent morning at *Cynomys* colony N. of Waverly. Clouding up by noon, hot & sultry. Nr. Ft. Collins, Colo.

July 7, 1955. Clear, warm; cloudy p.m. Count & inspection one *Cynomys* colony in morning. Nr. Ft. Collins, Colo.

July 8, 1955 Clear morning, cloudy mid-afternoon, warm. Count & inspection 2 colonies near town. Larmer Co., Colo.

July 9, 1955. Partly overcast a.m., cleared by noon, warm. With Don ~~Harvey~~ Harvey of Colo. A&M. visited 3 *Cynomys* colonies. 11 mi. N. ~~Wellington~~ Waverly I saw 2 small *Phrynosoma*. To Wind Cave N.P., S. Dak.

July 10, 1955 Drove to Wind Cave. Windy & warm. Grass drying now in SE Wyoming, *Bromus* already dry.

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July 11, 1955 Wind Cave N.P., S. Dak.

Observed prairie dogs & colony Shirttail Canyon. Rain on & off in afternoon, & thunderstorm. Les Albee, SCS, arrived to help me. Bromus, dry, now in prominent pattern in greener grasses in pk.

July 12, 1955 Sprinkles during night. 1/10 cumulus, fair breeze, warm day. With Les Albee visited several Cynomys towns in park, especially looking for range vegetation effects. Saw a flock of 30± mourning doves in Highland Creek area. Between Hot Springs & Wind Cave, about 6 p.m., saw about 20 night hawks. Coyotes heard every night in Shirttail Canyon, & antelope seen every day.

July 13, 1955 With Les Albee studied vegetation on Cynomys town in Shirttail Canyon. ~~[illegible]~~ Warm, mod. breeze, 3/10 cum. clouds.

July 14, 1955. Continued vegetation study. Completed two line transects. Visited other C. l. towns in park.

To Devil's Tower, Wyoming

July 15, 1955 With Albee drove to Devil's Tower, arriving 10 a.m. Looked over town & identified plants. Clear hot day.

July 16, 1955. Identified plants. Albee left for Rapid City. Took photos & ecol. notes. Hot clear day, but breeze.

July 17, 1955, Counted prairie dogs, took photos, made step-point range analysis 1 area. Hot clear day. Departed 2:30 p.m. & drove via Newcastle to Ft. Collins, Colo.

July 18, 1955. Correspondence & office work. Hot day.

July 19, 1955. Spent most of day at Cynomys colony at CPER. Saw a Buteo with white tail, white near each wrist on upper surface wings, nearly all white below, over Sec. 22, CPER.

Rocky Mtn. Nat'l Park, Colo.

July 20, 1955 Visited R.M. Nat'l Park. Drove to Fall River Pass, then to Bear Lake. Hiked to Dream Lake. There saw a marten, & nearby several rather tame marmots. Chickarees, golden mantled

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July 20, 1955 Rocky Mtn. Nat'l Park, Colo.

Citellus, *Eutamias*, Richardson *Citellus* all present & rather tame in park. Tame Clark nutcrackers near Bear Lake. CPER, Weld Co., Colo.

July 21, 1955 Spent most of day mapping and examining *Cynomys* colony at Sec. 22, CPER. Overcast with thunder afternoon.

July 22, 1955 Ft. Collins, Colo.

Office work all day on maps, transects, collections.

July 23, 1955 To Wind Cave N.P., S. Dak.

Departed Ft. Collins about 7 a.m. Drove to Briggsdale & visited Woody Williamson. Then on to Sterling, Bridgeport (Nebraska), & Hot Springs S. Dak. (about 330 miles). Rain for 2 hrs. afternoon. Heavy overcast Hot Springs. Drove to Custer & visited trapper George Barnes. Some sprinkles at night. // Between Sterling (Colo.) & Dalton (Neb.), I saw 7 *Citellus 13-lineatus*. A freshly dead *Mustela frenata* on highway near New Raymer. Several young pheasants seen at edge road or dead on road. A dead badger on road near Sidney, & another about 20 mi. N. // Sterling area about 3900 ft., green & damp compared to Weld Co. plains, & much cultivation in area. W. Nebraska too much cultivated, grain & corn. Rolling, not flat, plains. Some (15% est.) cattle range in Neb. along route I took (Neb. #19). Near Chadron a State Park with a few thousand acres ponderosa pine in hills. Near full moon but overcast night. Coyote chorus in Shirttail Can.

July 24, 1955 Overcast a.m., clear & 15 mph wind (S) by noon. Worked at counting & mapping on *Cynomys* town Shirttail Canyon.

July 25, 1955 Clear early, overcast by noon, rain afternoon, evening. Counted & mapped at Shirttail *Cynomys* town. Spent afternoon with George Barnes & Harold Haecker, F & WL Service, visiting & poisoning a *Cynomys* town. A few crows in Shirttail C., but magpies now rare.

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July 26, 1955 Wind Cave N.P., S. Dakota

Rain on & off early a.m. 9/10 cu-str. clouds 7 a.m., calm, warm. Cleared. Many grasshoppers now. Mapped & censused vegetation in Shirttail Canyon.

July 27, 1955. P Overcast morning. Put in permanent stakes on transects & parts of King's grid in Shirttail Canyon. Talked with ranger Jones, who had been here same time as King. Drove to Rapid City, Wall, then Badlands Nat'l Monument (Cedar Pass area). Badlands are eroded hills, often sharp topped, of grey clay with reddish strata. Saw two black-headed gulls near Wall,+ a nighthawk. One bat Cedar Grove in evening. Warm & rather humid evening. Country Rapid City to Wall gently rolling with corn or other grain or feed, but much in short or mid-grass pasture. Badlands N.M., SW S. Dakota

July 28, 1955 Many owl calls (' " . .) heard at night near Cedar Pass Lodge. 6 a.m. warm, still, 1/10 cirrus clouds. Talked with Supt. Rutter. Drove on to Midland to see ferret habitat. Then back to Philip & talked with Zimmerman, of SCS, & with Don Thompson. Returned to Wind Cave N.P. // Many dead Citellus 13-lineatus on road; 7 dead 1 alive between Philip & Midland. I also saw 2 badgers d.o.r. in Pennington Co. Heavy thundershower mid-p.m.

July 29, 1955 Wind Cave N.P., S. Dak.

6 a.m. warm, 1/10 cirrus, calm. Counted Cynomys & inspected vegetation on various C.l. towns in park. Saw 5 bull elk in velvet, heard bull bison roar. About 4 crows still in Shirttail Canyon. Saw one Citellus 13-lineatus in park. About 6:30 pm a gp. of 12 Clark nutcrackers flew over, calling. In Shirttail, coyote chorus of 4 or + at night, & Bubo heard.

July 30, 1955. Clear, warm. Inspected Bison Flats Cynomys town, then departed for Ft. Collins. Grain now ripe & being harvested between Cheyenne & Torrington. In Cheyenne region, grass short and lawn-like on pastures, but green. Saw 1 Buteo regalis; 2 dead Taxidea on road. Photod & examined poisoned Cynomys town nr. Mule Creek Junction.

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~~1st~~ August 3, 1955 Nr. Ft. Collins, Colo.

Accompanied 2 Game & Fish Dept. men on antelope count plane flight in NE Larimer Co. Counted bucks, does, fawns. I photographed prairie dog towns from plane. Half overcast, calm, warm, muggy day.

August 4, 1955 Weld Co., Colo.

~~Spe~~ Visited Wellington Cynomys colony & spent several hours at CPER colony. Lark buntings now in flocks of 40±. Saw 1 Falco mexicanus at CPER, 1 Crotalus in burrow. Overcast, windy. Rain in evening at Ft. Collins. CPER, Weld Co., Colo.

August 5, 1955 8/10 overcast, warm, humid. Much water on roads & ground CPER area. Saw first juv. Speotyto today, at CPER. Saw 1 ferrug. rough-legged hawk. Spent day at CPER colony, mapping & inspecting vegetation.

August 8, 1955 G.E. Klipple said that about 20% vegetation is all ground usually supports this climate (sq. ft. density method). Many forbs this year as dry last year so grass competition reduced. Much grass, including Buchloe, Bout. grac., has died, some Bgr this year. // Visited CPER personnel, then Sec. 22 colony. ~~at SE end, no sqr activity when at 7130 shot trapped~~ worked on ~~transect~~. No rain today, but last night, & much last 2 days.

August 9, 1955 Mapping, inspection, counting at CPER. Rather clear air, 15 mph, 1/10 cumulus clouds. Nr. Wellington, Colo.

August 11, 1955 Visited Wellington Cynomys colony. Counted prairie dogs, inspected vegetation. Many biting flies some areas of Kochia. Increasing cloudiness during day but no rain. Warm & humid. Nr. Ft. Collins, Colo.

August 12, 1955 Vegetation analysis, counts, inspection of Spring Canyon prairie dog colony. NE Larimer Co., Colo.

August 15, 1955 Inspected two colonies, especially vegetation, on Rudy Ackerman ranch 10 mi. N. Waverly. Clear morning; 5/10 cloudy p.m.

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August 16, 1955. CPER, Weld Co., Colo.

at CPER colony counted dogs (Cynomys), repaired & marked stakes, set 5 traps. Saw 1 marsh hawk there. 15± ducks on temporary pond, & dark gray sandpipers with much white border tail.

August 17, 1955 On pond 50 yds. across, 30± ducks, 2 kinds sandpipers, killdeer, avocets (S. edge Sec. 22). Traps (5) at CPER colony held 1 Sylv. (♂ 700 gms), 1 Sylvilagus foot, 1 Speotyto. Left traps set. Worked on counts, markers, vegetation, new burrows. All overcast 10 a.m., rain 1 p.m. at CPER.

August 18, 1955. Clear morning, 1/2 cumulus p.m. at CPER laid out areas for ~~counting~~ sampling vegetation and counted Cynomys. Saw 2 Marsh hawks, 1 Buteo regalis, & 12± apparent Swainson hawks flying high, at Cynomys colony. // Jim Lawrence & G. E. Klipple agree that this year Salsola more abundant than any year since 1940 (poor grass last year reduces ~~[illegible]~~ competition for weeds & favors them).

August 19, 1955 Overcast & hard rain at Ft. Collins. In p.m. visited CPER colony & started 2 men on vegetational survey.

August 20, 1955 Nr Ft. Collins, Colo.

Made counts & inspection vegetation 2 Cynomys colonies. Clear a.m., overcast p.m., hot & humid.

August 21, 1955 Continued surveys colonies near town. First saw Cynomys in milo field. Clear a.m., clouding p.m.; hot & humid.

[illegible] TO Kansas

August 22, 1955 Departed Ft. Collins 10 a.m. and drove via Ft. Morgan and Wray, Colo., to NW Kansas on way to Lawrence. No rain. Much cultivated area near Greeley and east to Brush, then mostly uncultivated range. Near Norton, ~~[illegible]~~ Kansas, I saw one

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August 22, 1955 N. Kansas

Cynomys town. Stopped for night nr. Beloit. Warm & humid.

August 23, 1955. Drove on to Lawrence and Natural History Museum of Kansas Univ. Visited Hall, Baker, Tordoff, and others. Visited nearby natural history reservation. Copied information from files.

August 24, 1955 To SW Kansas

Drove to Plum Thicket Farm near Sharon, Barber Co., Kansas, where Ron Smith working on prairie dogs, and inspected his study area. Met Floyd T. Amsden, owner, and Thomas (brother). Hot ~~today~~; 92° at 7 p.m.

August 25, 1955. Visited Cynomys colony. With Dr. Hall looked at ponds and pastures on Amsden's ranch. This ranch now not grazed, so grass tall & thick. Much tall Andropogon. Saw 3 turkey vultures, 2 Mississippi kites. Dr. Hall departed for Lawrence. Hot day but mod. SE breeze. I set 10 snap traps in area blind #2 of Cynomys town.

August ~~27~~ 26, 1955. Traps held 2 Peromyscus maniculatus, 1 Onychomys leucogaster (discarded all). Insects ~~eat~~ ate bait most traps. Trapped 2 Cynomys (139, 140) for examination. Counted Cynomys. Visited Amsdens. Visited Soil Cons. Office in Medicine Lodge. Hot day; no clouds.

August ~~28~~ 27, 1955 Took photographs & inspected effects of Cynomys on local colony (Hawkins Ranch, 5 mi. N., 1 1/2 mi. E. of Sharon). Departed for Oklahoma 2 p.m. Drove S. via Alva. Some large sand hills bare of vegetation on W. side in that region. Much naked ploughed ground now. Soil red. Milo about mature. I continued on to Wichita Mtns. Nat'l Wildlife Refuge, nr. Cache, Okla.

August 28, 1955. Longhorn cattle graze on bluestem rolling plains here. Large areas of oak to 12" diam., 20' tall. Crows & turkey vultures common. Mountains of rugged blocks reddish sandstone. 9/10 overcast

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August 28, 1953 *Wichita Mtns.*, *Oklahoma*

and muggy today. Blue grama & buffalo grass present here, but 2'-3' tall *Andropogons* dominant. Many lakes, ~~perhaps~~ most artificial, on refuge, & well traveled by people (800 000/yr. says manager). Talked with manager Ernest Greenwalt & toured prairie dog areas with him (see *Cynomys ludovicianus* notes). Heavy grazing increases mesquite trees here; grass decreases plum thickets. Rain about noon, overcast all day. Drought of past 3 years (not this) killed many blackjack oak.

August 29, 1955. Hot & muggy but no rain. Photoed & noted *Cynomys* on Official prairie dog town. Talked with Manager Greenwalt and assistants. In evening & night much lightning & thunder.

August 30, 1935 1.72" of rain last night. Partly overcast today. Counted & mapped *C. l.* on Official town. Visited a small *Cynomys* town among mesquite trees near Indiahoma. Short visit to Baker Mtn. area. Saw wild turkeys, elk, & white-tailed deer (many) on refuge. Turkey vultures common, but only one hawk seen (red-tail). Cooler today.

August ~~30~~ 31, 1955. Partly cloudy; hot p.m. Spent day with Jean Matthews of Soil Cons. Service, Lawton, Okla., looking over *Cynomys* areas on refuge & mesquite area with *C. l.* near Cache. Wich. Mtns. Nat'l WL Refuge, Okla.

September 1, 1955 Took photographs. Spent most of day with Arthur Halloran, biologist here. Set 5 steel traps for *Cynomys*. First all clear day since I arrived. Cut open a dead *Crotalus* & found 2 *Peromyscus* in stomach.

September 2, 1955 Studied vegetation on Isaac Mtn. flat. Drove via Altus to *Canadian*, Texas, where several men working on a game management area. Nr. *Canadian*, Texas

September 3, 1955 Looked over rodent study project and a *Cynomys* town on game management area among sandhills.

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September 3, 1955 Nr. Canadian, Texas
Discussed methods & problems with Jack Inglis, Paul Lukens, Jack Parsons, & Mr. Jackson, all working for Game & Fish Comm. on area. Many Buteos here, & many Dipodomys ordii. Departed late p.m.

September 4, 1955 To Ft. Collins, Colorado
20 to 30 mi. S. of Garden City, Kansas, I saw about 15 Swainson hawks, many perched on ploughed flat fields. Much ~~kaffir corn~~ milo maize growing. Many dead jackrabbits ~~on~~ road S. of Garden City. I drove ~~Sep~~ via Lamar, Kit Carson, Strasburg, Ft. Lupton, to Ft. Collins.

September 7, 1955 Nr. Wellington, Colo.
Visited Wellington preserve and horse pasture colonies. Apparently several ~~dogs~~ Cynomys gone from part of former where population was most dense. Denver, Colo.

September 12, 1955 Visited Ray Fugate and Leland Bowers at Predator & Rodent control office. Visited Wildlife Research Lab., especially Spencer, Ward, Welch. Visited Niedrach & Bailey at Denver Natural History Museum. Nr. Ft. Collins, Colo.

September 13, 1955 Mapped extension of Spring Canyon Dam prairie dog colony. Short thunderstorm mid-afternoon.

September 14, 1955 NW Weld Co., Colo.
Inspection of colony & vegetation at CPER Sec. 22 Cynomys colony. Clear & hot a.m.; breeze & ½ overcast p.m. Saw 1 coyote, ~~mash~~ marsh hawk, 1 Crotalus, many horned larks on colony area.

September 15, 1955 Visited colonies at CPER, James Lawrence ranch, McIntosh ranch. Saw occasional marsh hawk or ferruginous rough-legged hawk. ~~Clear &~~ Half overcast, not hot.

September 16, 1955 Nr. Ft. Collins, Colo.
Office work. Clear day, not hot.

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September ~~18~~ 19, 1955 Nr. Ft. Collins, Colo.
Overcast. Some hard rain in late afternoon. Inspected three local colonies *Cynomys*.

September 20, 1955. Rain & hail morning. Clearing & windy afternoon. Visited Spring Canyon Dam colony. First snows of fall in mountains. To Nebraska & S. Dakota.

September 21, 1955 Clear ~~stat~~ cool day. Drove via Cheyenne to Scotts Bluff Nat'l Monument & looked over site former prairie dog town. Stopped at Tenney Ranch (Warren Livestock Co.) for preliminary talk with ~~for~~ manager. Drove on to Hot Springs, S. Dakota. Storm & light rain evening. Rain for last 2 days there.

September 22, 1955 Wind Cave Nat'l Park, S. Dak.
Light rain & cold. Office work at park headquarters. // Yesterday at Cheyenne, Wyo., in Wyo. State Museum, in State Office Bldg., saw mounted *whooping crane* labeled "Killed by James Libby. Nov. 1901." // Rain stopped. Clear & cold. Inspected Bison Flats town.

September 23, 1955. Cold clear night. Alto-stratus overcast complete by 10 a.m. Took photos & examined all of Shirttail Canyon dog town.

September 24, 1955 To Medora, N. Dakota
Drizzling rain at Wind Cave. I left & drove to Rapid City, where talked with Les Albee, SCS. (Snowing at Custer.) Then drove north to Jacobi Ranch near ~~Buffalo~~ Ludlow to investigate ~~albino~~ albino dog town (not seen this trip). Ralph Jacobi long sheep rancher there has much wildlife information (Harding Co.). Then drove on to near Medora. Cold but dry night. Theo. Roos. NMP, N. Dak.

September 25, 1955. Went into Theodore Roosevelt National Memorial Park, visited personnel, investigated some *Cynomys* colonies. Dry here this year, (~~4~~ 4th year of drought nr. Ludlow).

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September 25, 1955 Theo. Roosev. N MP, N. Dak.

Overcast, cold, ~~mod.~~ fair + breeze. Drizzling rain afternoon.

September 26, 1955.

At Dickinson I talked with SCS soil men. At TRNMP collected two Cynomys, visited towns, saw 1 badger. Talked with Chester Brooks. Overcast, about 50°F. max. temp. Clearing in evening.

September 27, 1955 Took photos, examined Cynomys colonies, trapped 4 Cynomys + examined them. Saw 3 golden eagles at once near Cynomys town. Photo'd badger at mouth of burrow. Saw 3 blue racers + 3 chipmunks today. Generally ~~warm~~ cool + partly cloudy; nice fall day.

September 28, 1955 Clear early a.m. Trapped 2 Cynomys. Counted ~~[illegible]~~ them at same areas. Saw 1 badger. Visited Brooks & Fitch of NPS staff. Yesterday I saw 3 Eutamias and 2 blue racers out on ~~park~~ Park. At 9 a.m. departed & drove to Jacobi ranch nr. Ludlow, S. Dak. Spent afternoon on Cynomys town having many albino dogs. In night drove to Devils' Tower, Wyoming. Rain + lightning starting about 6 p.m., intermittent. Devil's Tower, NE Wyoming.

September 29, 1955 Visited Cynomys town. Investigated vegetation, burrows, population. Took photographs. Half overcast & cool. Greener here than at Ludlow or Medora. In evening drove to:

September 30, 1955. Wind Cave N.P., Hot Springs, S. Dak.

~~Col~~ Cool, clear, mod. wind. Trapped Cynomys in Shirttail Canyon. Made counts & examined vegetation at other colonies.

October 1, 1955 Visited colonies in Wind Cave N.P. in morning. Saw 1 badger. Drove via Torrington to Ft. Collins, Colo. (288 mi. from Wind Cave N.P.). Saw hawk eating Cynomys. Clear and cool.

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October 6, 1955 Larimer & Weld Cos., Colo.

Visited CPER colony. Set 10 steel traps. Set 6 at J. Lawrence ranch. Took 1 *Cynomys* (♀162) for exam. Short visit at Wellington (Reserve) colony. Cold wind & ½ overcast morning; clearing in afternoon. Saw but 1 hawk - a marsh hawk.

October 5, 1955 To Boulder, Colo.

Visited Dr. Rodeck at Henderson Museum of Univ. Colo. Looked over *Cynomys* & *Mustela nigripes* specimens. Talked with Dr. Paul Maslin. Read theses in library. Returned to Ft. C.

October ~~8~~ 7, 1955 Nw Weld Co., Colo.

Clear, warmer. Frost last night (first of fall). Took up traps. Caught 2 *Sylvilagus*, 6 *Cynomys*. Saw a prairie falcon & an imm. golden eagle 1 mi. from dog town.

October 10, 1955 Larimer Co., Colo.

Talked with Willard Graves, SCS, Ft. C., & received range information from him. Set 15 steel traps for *Cynomys* in area 8½ mi. N. of Waverly. Killed 33" *Crotalus* on dog town. Clear & calm today & warm. Talked with County Agent Don McMillan.

October 11, 1955 Visited traps & set 2 more. Strong W. wind & partly overcast.

October 12, 1955 Clear, cool, calm. Took up nearly all traps, set 3 more. Visited *Cynomys* town near Dover, Colo. Larimer & Weld Cos., Colo.

October 13, 1955 With Willard Graves, range conservationist, SCS, visited *Cynomys* towns. Clear, calm, warm day. Visited Charles Terwilliger of Range Mgt. dept., Colo. A&M.

October 14, 1955 In afternoon visited Sec. 10 colony, 9 mi. N. of Waverly, & set 16 steel traps, 15 snap traps. Clear, calm, warm day.

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October 15, 1955 N. Larimer & NW Weld Co., Colo.
With Dr. Paul Maslin of Colo. Univ. & 3 students visited 3 *Cynomys* towns & searched for rattlesnakes, but found none. ~~Clear~~ Clear, warm, light breeze. Saw 1 *Aquila* & one *Falco mexicanus*.

October 16, 1955 Visited Sec. 10 colony 9 mi. N. Waverly & took 1 *Cynomys* & 1 *Taxidea* from 15 steel traps set there. No catch in 15 snap traps set near *C. l.* holes (one *Onychomys* yesterday). Took up snap traps. Set 3 near small burrows in silty soil on low rise. One *Sylvilagus* in steel trap at *Cynomys* burrow.

October 17, 1955 N. Larimer Co., Colo.
Visited steel traps at Sec. 10 & took all up. Took no *Cynomys*, 1 juv. *Sylvilagus* (small). 3 snap traps held one *Onychomys* (discarded; see species notes). At Sec. 10 colony I shot 6 *Cynomys* for examination. NW Weld Co., Colo.

October 18, 1955 At C.C. near buffalo ranch 1 mi. N. of Rockport I shot 6 ~~Ort~~ *Cynomys* for examination. At CPER shot 2. Saw 2 eagles & 1 *Crotalus* at CPER. ~~Calm~~ Clear, warm, but mod. wind. NW Weld Co., Colo.

October 19, 1955. Examined carcasses a.m. In p.m. visited Terry Ranch near Wyoming line & viewed several *Cynomys* towns. Warm, high clouds, moderate breeze. Nr. Ft. Collins, Colo

October 20 1955. With Dr. Beidelmann & ecology class visited colony near town & dug burrows, surveyed number mounds, amount soil in mounds, & relation to slope. Overcast; ~~sprangling~~ sprinkling of rain in p.m.

October 24, 1955. Depart → Boston
Drove to Ft. Morgan from Ft. Collins & took train for Chicago on way to A.O.U. meetings in Boston. Region east of

Journal

October 24, 1955 Weld & Morgan Cos., Colo.
Greeley dry appearing with many near short (Buffalo grass) grass, sandhills with *artemisia* (*filifolia*?).

October 25, 1955 To Boston, Mass.
Took plane Chicago to Boston, Mass., to attend A.O.U. meetings. Also attended meetings Oct. 26, 27, 28 and talked about my prairie dog project with Victor Cahalane and others.

October 29, 1955 To Bangor, Maine
With Mr. & Mrs. Ralph Palmer drove to Brunswick, Maine. Later took train to Bangor. Bar Harbor, Me.

October 30, 1955 Visited Dr. John King at Bar Harbor and talked about *Cynomys ludovicianus* and his study at Wind Cave. King now works in Animal Behavior section of Roscoe B. Jackson Memorial Laboratory.

October 31, 1955. Looked over King's notes & photos of prairie dogs. Visited laboratories. Returned in evening to Bangor & took train to Boston.

November 1, 1955 To New York, N.Y.
Took plane to N.Y. In afternoon talked with Fairfield Osborn and Mr. Snyder at Conservation Foundation concerning prairie dog study & report.

November 2, 1955. Spent most of the day at the N.Y. Zoological Park conferring with John Tee-Van, Lee Crandall, and others concerning prairie dog project.

November 3-4, 1955. To Washington, D.C.
Train to Washington. Spent morning at mammal dept. of U.S. National Museum. Talked with Viola Schantz, Dave Johnson, Stanley Young. In afternoon had

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November 4, 1955 Washington, D.C.
conference with J. E. Graf, Dr. Carmichael, Dr. R. Kellogg, Mr. Keddy, concerning job as Resident Naturalist of Barro Colorado Island, Canal Zone. Plan at present is for me to start July 1 there, with housing at Balboa. Zetek, present manager, due to retire December 1956.

November 5, 1955 Bus to ~~[illegible]~~ Laurel, Md., and spent half day at Patuxent refuge with Chandler Robbins of F&WL Service. Returned to Washington, D.C.

November 6, 1955 Spent half day looking at specimens and files in National Museum.

November 7, 1955 Bus to College Park, Md., to look at photo files of F&WL Service (Rex Gary Schmidt in charge). In afternoon talked with Ben Osborn, Info. div., Soil Conservation Service, & with Dr. Graham of S.C.S., at Washington, D.C.

November 8, 1955 Spent morning at National Museum. In afternoon flew to Chicago & took train for Colo.

November 9, 1955. Arrived Ft. Morgan by train & drove to Ft. Collins, Colo.

November 10, 1955. About 4" wet snow on ground in town in morning.

November 15, 1955 Snowing again this morning. Old snow in spots thru yesterday. Snowed on 12, 13. Constantly overcast & cold. Prairie dogs have been hit by winter.

November 16, 1955 Below freezing all day & near 0°F. last night. Brief visit to Cynomys colony in town; rabbit tracks common, Cynomys rare. No new snow today.

Journal

November 29, 1955. Nr. Ft. Collins, Colo.
~~No~~ Warm wind yesterday; cool but nearly clear today. Rare spots snow remain. Visited Spring Canyon Dam colony + counted 24 C.l.

December 6, 1955 About 6" snow fell Dec. 2. Still mostly on ground. Below 0° night before ~~of~~ Dec. 5. Today visited Spring Canyon Dam colony. No activity of Cynomys there. / G.E. Klipple says that at CPER November weather was worst since 1946 — much wind. Many tumbleweeds on fences; snow weight + wind on them broke wires from many fences. He believes wind over 50 mph a few days each month in winter.

December 9, 1955 Visited Spring Canyon Dam colony briefly. Very strong winds yesterday. Most ground snow covered still. More snow on December 14.

December 14, 1955 Nr. Wellington, Colo.
About 1" snow fell morning. Afternoon clear + sunny but cold. Visited Wellington prairie dog colony. Saw 2 Cynomys out. Also saw 1 marsh hawk and 1 ~~ferrug~~. rough-leg hawk (perhaps 2) at Wellington preserve ~~preserve~~.

December 15, 1955 Clear but cold. Visited Wellington colony + set 3 steel traps for Cynomys seen out. Saw a Buteo lagopus on telephone pole there. A fresh casting below was of mouse hair + bones, probably Microtus. Also visited CPER colony. 2' deep snow drifts at fenceline there. Many rabbit tracks + several Cynomys out, tho below freezing. Set 3 steel traps there. Picked up several eagle casts atop hill near colony + saw one eagle there, another flying nearby.

Journal

December 16, 1955 Larimer & Weld Cos. Colo.
Clear & rather warm, but strong W. wind which melted much snow. Visited 2 Cynomys colonies but saw none. Saw 3 Buteo lagopus in drive of 60 miles (to CPER & return).

Nr. Wellington, Colo.
December 18, 1955 Picked up steel traps set for Cynomys. No catch. Cold and partly overcast today.

December 20, 1955 Nr. Ft. Collins, Colo.
Warm today & much melting of snow. At local colony I saw 12 Cynomys out feeding, & set 10 steel traps at burrows. Les Albee, SCS, Rapid City, S. Dakota, writes that they have had 6 or 7 weeks of winter & much snow there.

December 21, 1955 Warm, calm, overcast; much melting of snow. Visited traps. Took one ♂ Cynomys. Set 4 additional traps, so 14 out.

December 22, 1955. Again warm, calm, overcast. Visited traps & took 1 Cynomys (07191). Much melting of snow; ground muddy.

December ~~24, 1955.~~ ~~25~~ 23, 1955, Warm but windy ~~yesterday; calm & warm today - perhaps best weather since early November.~~ Checked Cynomys traps & took 1 Sylvilagus. Visited Wellington preserve colony & photoed exclosure.

December 25, 1955 Checked local Cynomys traps; no catch. Warm, calm, partly overcast.

December 26, 1955. Visited CPER colony & shot 3 Cynomys for examination. Took up all traps near Ft. Collins. Warm, calm, partly overcast.

December 31, 1955 Departed, Colo. to Calif.
Weather remained fairly warm. Departed in a.m. & drove to Glenwood Springs on way back to MVZ at Berkeley, Calif.

SPECIES ACCOUNT
Cynomys ludovicianus

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Cynomys ludovicianus

December 10, 1954 Denver, Colorado.

Talked with Robt. Niedrach, taxidermist of Denver Museum. He said no doubt Cynomys has disappeared because of poisoning in last 15 yrs. He knows of colony of about 20 near Denver. Formerly many in Weld Co. near Wyo.-Nebr.-Colo. junction, nr. Hereford, & this might be best area to study. There has been an effort to set aside this region as a preserve. Dr. Wagar of Forestry Dept. has been active in this. Big cattle companies (especially Warren Co. of Cheyenne) oppose this. Since poisoning big reduction in eagles, ferrug. rough legs, prairie falcons, & some other raptores that nested in cliffs that region. Niedrach ~~this year~~ in Colo. 42 years (with Museum). Little fieldwork last 10 yrs. An enthusiast & talkative. Reminded me of a tall Bert Harwell. Col. Wolf, the egg collector, has worked Hereford area in past & could give info on raptor abundance years ago.

Driving Denver to Ft. Collins via U.S. 87 highway, saw no active Cynomys sign but humps in some fields that may be ~~long vacant~~ old mounds of p. dogs.

December 11. Nr. Fort Collins, Colo.

Below foot of Spring Canyon Dam on land heavily used by cattle I saw many p.d. mounds & holes. Heard one & saw it on surface. Mound was fresh symmetrical crater, well dotted with indentations of apparent butting. These on (Sec. 33, SW 1/4) E. side road 200-400 yds. On W., uphill side road were old burrows in (mixed in summer) short grass pasture. None appeared to have been used for months. Slight vegetation & this heavily grazed in area active burrows. Drove on foothill road

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Cynomys ludovicianus

December 11, 1954 Nr. Ft. Collins, Colo.

south to nr. Loveland, then W. E., then N. to Ault, & back to Ft. C. Saw no more recent mounds. Corn, wheat, & sugar beets grown extensively here. Hereford cattle & flocks sheep also plentiful.

Dec. ~~13~~, ~~14~~ 15, 1954. ~~Visited~~ Visited a pasture at foot of hills west of Ft. C. (La Porte Ave; nr. airport) with Don Hervey of Forestry Dept. He had known of a C. l. town there. This had been poisoned about 1948 by Maynard Cummings' men (M. C. now in Sacramento). No fresh burrows found though ~~so~~ many mounds still present and holes open. These were on a gentle E. slope about 1/4 mile S. of a lake. Jim —?, the man locally in charge of the range, said that the area had been re-poisoned about 2 years ago. Heavy overgrazing here. Buffalo grass & blue grama common.

December ~~15~~ 16, 1954. Talked with Mr. Klipple, in charge Central Plains Exp. Sta., which is part of NE Colo. Land Utilization Project of USFS now. Hdqtrs. of project at Briggsdale. R.E. Williamson is ranger there. Klipple says there is a small C. l. colony on next to the experimental range (Sec. 22) & there have been others. Range use known there so may be good area for study. Klipple said that about 1918 he was stationed at Fort Sill, Okla., & that there were many Cynomys there. One colony near a firing range was a mile across.

December 17. With Gurney Crawford, game warden, visited an 80 acre (N 1/2 Sec. 35) game preserve near Wellington. This area

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December 17, 1954 Nr. Wellington, Colorado.

contained a colony of prairie dogs, perhaps 50 in number according to Crawford, that probably had never been poisoned. I saw at least 4 separate dogs out although the day was overcast and the wind strong (temp. 40°?). One dog was tame tho it had never been handled. It walked up to Crawford who fed it corn. This one named "Charlie." Charlie worked about a (4 in) well-formed burrow & mound. Mound showed no recent construction. An imm. seen 50 yds. from Charlie. Another dog was named "Good Eye." Crawford said that recently he saw him go down a burrow carrying a mouthful of grass. Crawford had seen prairie dogs drink and was sure that they ~~had~~ dug wells down to water. He thought, from some digging experience, that the tunnels spiralled down. He had kept pets when a boy. The yip, with ~~head & front of the~~ body straightened upward, was a sign to others that everything was all right. Others did it after seeing it done. (I saw Charlie & an imm. do it). A sharp chit-chit, a double note, was an alarm call that caused all to go underground. He thought that occasionally an old one was driven out of a colony as he had sometimes seen one wandering far from a colony. This colony apparently not poisoned because no one was interested. Rabbit-brush common in area. That in colony kept clipped low. No grazing here for 4 or 5 years, according to Crawford - but trampling by people & car tracks. Colony on gentle W-facing slope. Lower edge flat ground,

Cynomys ludovicianus

December 17, 1954 Nr. Ft. Collins, Colorado.

marshy in some seasons. Crawford ~~& Klipple~~ of opinion C. l. needed soil that would not cave in - thus not sandy. (Also probably not rocky). // Lee Dano thesis (master) (done under Colo. A+M Wagar) has map 11 Cynomys towns near Ft. Collins. Some exterminated since 1950. // This thesis showed many more cottontails (S. a. baileyi) on land with C. l. burrows than on near by areas having no C. l., presumably because burrows used for cover. //.

December 18, 1954. Up Buckhorn Canyon, west of Ft. Collins, about a mile ~~(?)~~ south east of fork to Stove Prairie, I saw a Cynomys (l.?) town on moderate slope, 1/4 mile S. of + above road (N. end Sec. 22). Mounds large + high. Patches of snow. No C. seen but perhaps some present. This is highest colony (of C. l.?) known to P. H. Baldwin. ~~local residents~~

December 19, 1954. Unusually warm for this season tho windy. Visited the "game preserve" 80 acres nr. Wellington. "Charlie" was conspicuous + I saw 4 or 5 others, mostly smaller than Charlie. Photos Charlie. At my first approach he walked up to within about 3' of me. I did not feed him. Later he allowed approach no closer than about 8'. He paid no attn. to corn thrown near him until some struck him, then ate (poor eyesight?). Charlie seen to go down at least 2 different burrows. The body straightening with back not seen. When I was close Charlie gave a loud chirp followed by chit-chit + fled down his burrow. He also made chirps followed by "stomach rumbling" sounds

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December 19, 1954 Nr. Wellington, Colorado.

while out of sight in burrow. One other carried a 4" long piece of ~~saltb~~ atriplex? ~~[illegible] (?)~~ to a burrow mouth when alarmed. One burrow on low side of colony was surrounded by 6" high growth of dry grass (invading?). A ridge of loose dirt about 10' high at E. edge colony showed trails + ~~some~~ some minor diggings. Fence at S. end separates preserve from heavily ~~used~~ grazed pasture where there are many burrows. If lack grazing ~~increases~~ decreases C. l., one would expect colony to move S. onto grazed pasture. Human tramping, + car tracks, + feeding dogs & pheasants, keep the preserve from being a proper exclosure to show effects removal grazing. Inside of cone of crater mounds indicate butting when soil muddy - hard + smooth texture. Surprise to me, few if any more C. l. out of burrows than on previous overcast + cold windy day. // Magpies, + raccoons, + housecats come in contact with C. l. at this preserve.

December 28, 1954. Nr. Nunn, Weld Co. Colorado. Visited Central Plains Experimental Range with G. C. Klipple, Agr. Research Service, USDA, the man in charge. This area had a small C. l. colony in a shallow draw near center of section 22. Klipple said it had expanded in past season. The whole area of CPER originally poisoned + repoisoned when government took over land about 20 yrs. ago. Perhaps other small colonies known to range riders. Eagles + hawks said to be commonest here in winter, K. said. I saw 4 or 5 Buteo (lagopus?) and a dead eagle.

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December 28, 1954. Nr. Nunn, Colorado.

Many jack & cottontail rabbit tracks in snow. Cottontails use C. l. burrows, tracks clearly showed. Brief examination discovered no C. l. out (30° temp. & 1" snow on ground). Bluffs visible to north similar to those near Grover, said Klipple. This might be one good area for study as range condition well known. No winter grazing here now although this is common practice in region. Cattle will be put on in May, when new growth sufficient. This range contains various grazing exclosures & a rabbit exclosure.

At Ft. Collins talked with Dr. Love, in charge of Front Range Research Center. He said there was a colony of prairie dogs (Gunnisoni) on the Manitou experimental area near Colorado Springs. He thought there was probably a relationship between overgrazing and C. l. abundance.

December 29, 1954. Ft. Collins, Colo.

Visited Mason, supervisor of Roosevelt National Forest. He said that the ~~C. l.~~ Cynomys (lud.?) mounds that I saw in Buckhorn Canyon (nr. center T 7N, R 71W) were inactive this year. He had shot ~~C. l. C~~ Cynomys there on occasions. He had also shot many, this year, near the Laramie River (in SE part T 11 N, R 77W). These black-tailed, he said, & near 8000 ft. altitude. Mason said that the C.C.C. had poisoned much prairie dog area when in operation. Long ago, he said, one could see prairie dogs everywhere. He thought that near Pueblo used to

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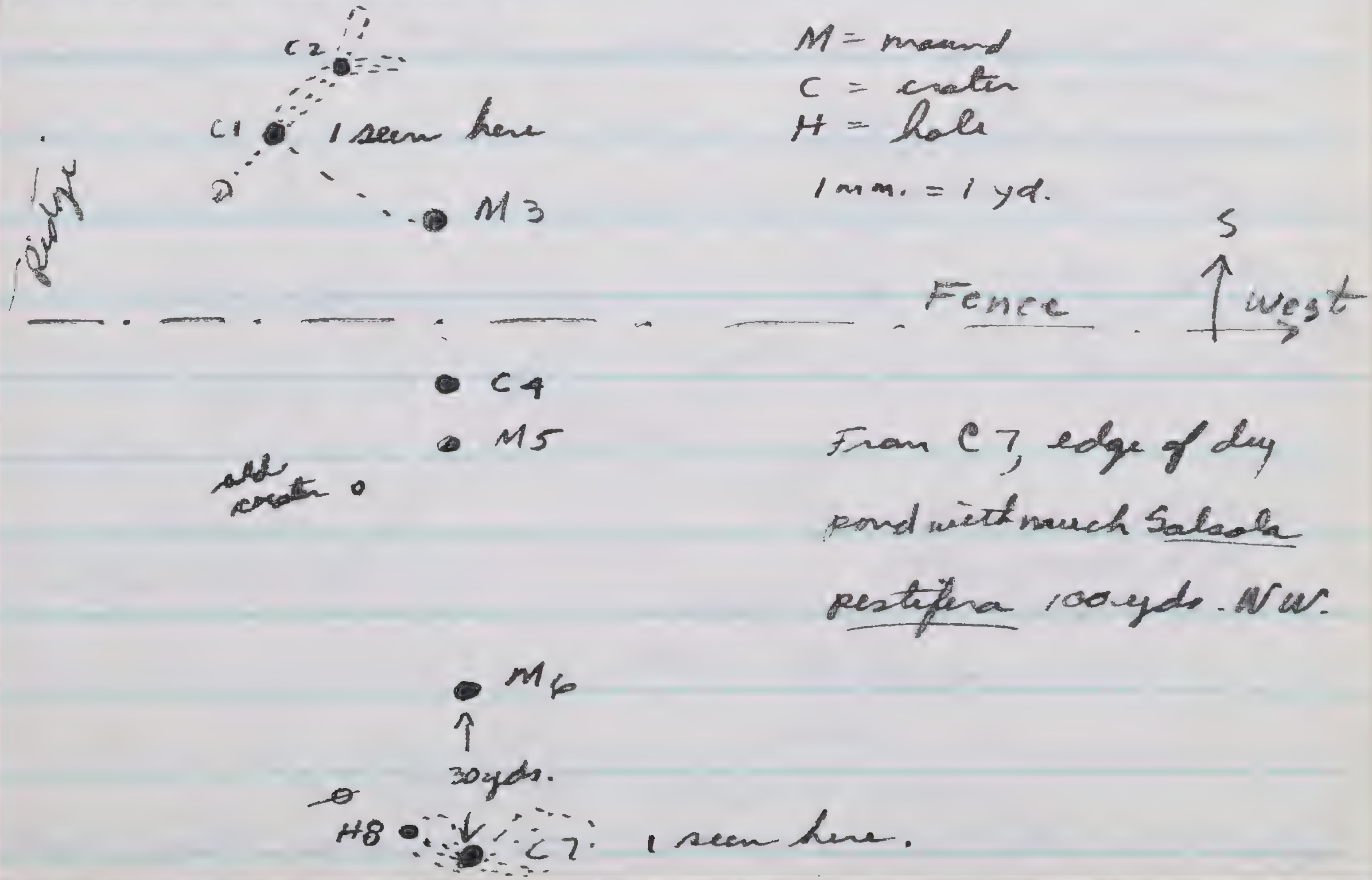
December 29, 1954 Ft. Collins, Colorado.

be an especially great number. On one occasion on the Roosevelt N.F. they had planted grass seed on an experimental plot. Some animals ate the new greenery. This proved to be prairie dog work, but where came from unknown. // I visited office of the County Agent, Donald McMillen. He was out. Secretary told me that they sold strychnine poisoned oats there to farmers wanting to poison rodents. Other control work was under Mr. Roy Fugate, Fish & Wildlife Service, Denver. Norton Miner of Ft. Collins had done local control work last year, on salary from county.

December 30, 1954 At about noon I visited colony 1/2 mile SE of foot of Spring Canyon Dam (SW 1/4 Sec. 33). I saw two dogs out atop mounds and investigated that area. Snow 2-3" deep, bright sunshine, & warm in sun tho probably < 40°F. air temp. Many rabbit tracks in snow. Dog or ~~coyote~~ tracks past burrows. Map of burrows near activity;



From C7, edge of dry pond with much *Salsola pestifera* 100 yds. NW.

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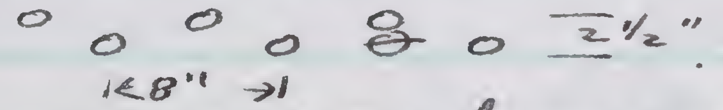
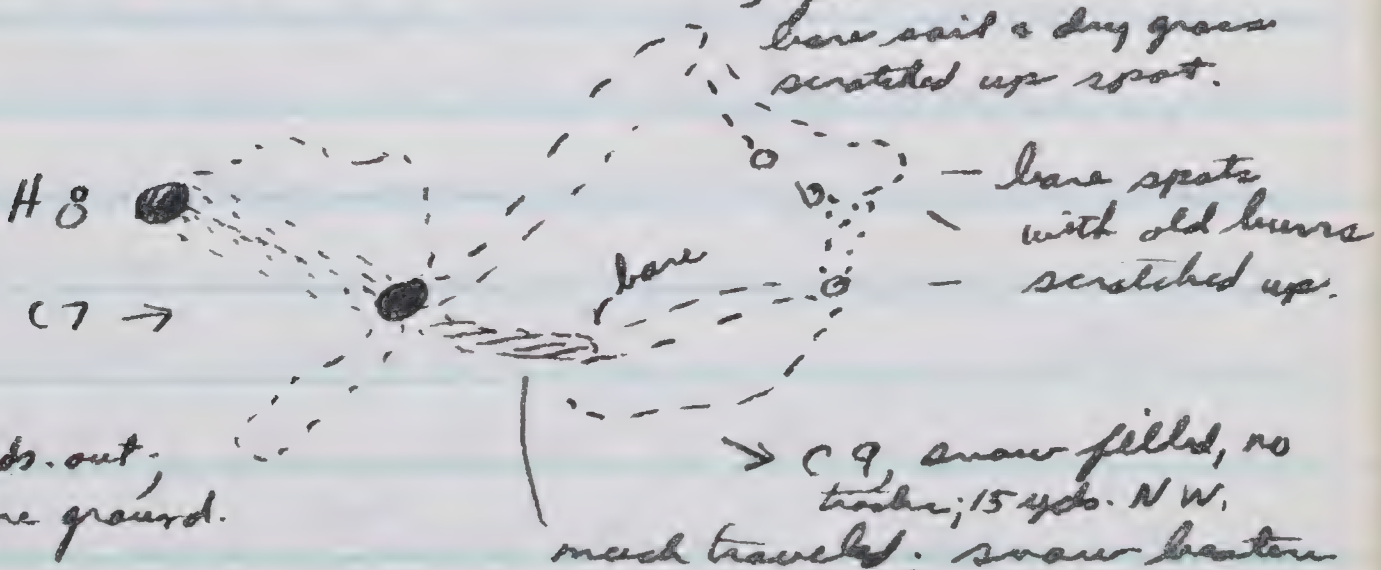
December 30, 1954 Nr. Ft. Collins, Colorado.

From C1, tracks out 5 yds. to 3 small spots of exposed soil having very short dry grass & fragments scattered suggesting eating. 3 sets tracks C1 to C2. From C2, tracks 5 yds. S & return. Apparent nibbling ~~in~~ at exposed 4" high base cut off shrub (Chrysothamnus ?). Sticks woody stalks roughly cut off. Also from C2, 4 sets tracks halfway to M3, to an exposed tip of small boulder. One set fairly straight C2 to M3. One fairly straight C1 to M3. (One might have used 3 burrows). // In 4" deep snow, tracks alternate (walk straddle-legged), thus:



About 3' east of M3 burrow, apparent gopher hole with fresh soil pushed out. No tracks M3 to fence. // C4 filled with snow; no tracks. M5 same - a wide old-appearing mound. Same at M6. C7 had many tracks, about 10 sets, to H8, which had practically no mound, & some freshly scratched soil at mouth H8.



5 yds. out to 6" diam. bare soil & dry grass scratched up spot.

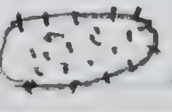
— bare spots with old burrs — scratched up.

2 yds. out, no bare ground.

→ C9, snow filled, no tracks; 15 yds. N.W.

much traveled. snow beaten down to nearly bare soil.

Xanthium (commune?)

Bare spots showed many burrs  dug up. Many

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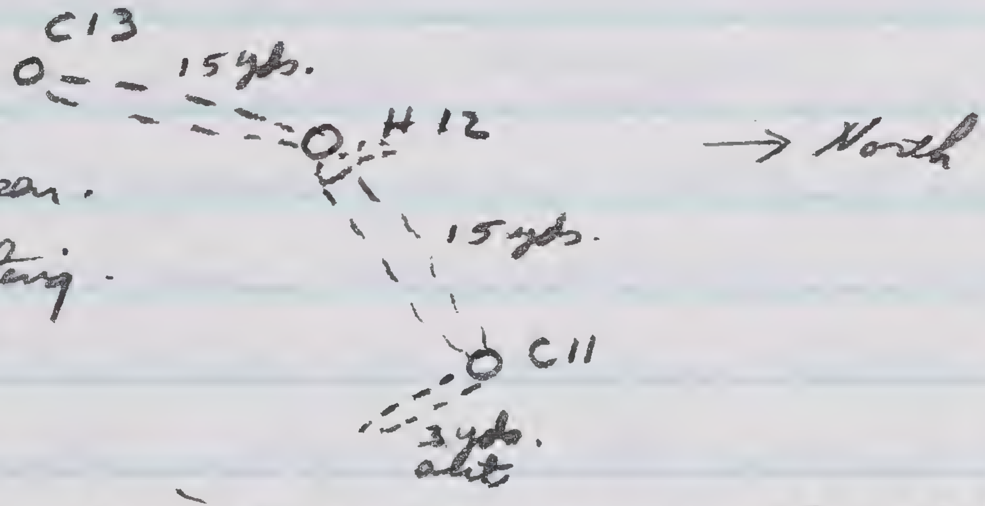
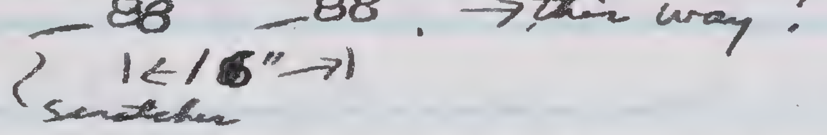
December 30, 1954. Nr. Ft. Collins, Colo.

of these open on one side but not surely eaten. Near one crater, tracks went to a piece of dry Salsola sp. // About 200 yds. west of C7 on a 10% N-facing slope I found one crater (C10) with tracks going 3 yards out and back. o-- . 40 yds. NW of C10, nearest of a group of 3 burrows with tracks between.



These holes open.
No signs eating.

One track showed jumping gait, apparently feet landing nearly together, jumps ~~18~~ 16" long, with scrapes of feet converging (or diverging?) to track; thus:



Burrow mound ridges clear of snow so conspicuous, in all this area. At least 50 fair burrows present but none today appeared to have had fresh work done on them. Tracks seen may have represented 3 individuals, 2 using 3 holes, 1 using 2. Little or no feeding. Some tracks rather aimless. Not follow same exact path twice, necessarily. This is very much overgrazed area with mostly bare ground. Same as visited Dec. 11 (but same active burrow not found).

Cynomys ludovicianus

~~December 30~~ January 2, 1954 Nr. Ft. Collins, Colo.

At about 3:30 p.m. I again visited the Spring Canyon Dam ~~colony~~ colony. The snow was now much more melted than 3 days ago & large patches ground bare. Many more prairie dog tracks than then. C 10 had no tracks near it, but C 13 and 13 others were connected by tracks. These 14 burrows north of fence and within an area of 90 x 50 yds. Some continuous tracks between ~~burrows~~ burrows went fairly straight for 50 yards or more. At least 10 sets tracks connecting some burrows. Obviously many that had had no tracks Dec. 30 now had them. No new construction noted. C 10, that had track Dec. 30, now had none. Wind apparently demolished tracks (including mine) of Dec. 30. Some tracks in groups of 4 ~~same~~ showing jumping locomotion, about 18" jumps (tip to tip). Some tracks out & back to same burrow, to 10 yds. out. // No tracks connecting this western group with the eastern group. In that gp. only C 7, H 8, had tracks last time, but now C 4 had 10± sets tracks, M 5 & M 6 also had tracks, tracks to old crater near M 5, & several sets tracks toward M 3. M 3 (1 track last time) had fresh scratching out of mud at mouth burrow. No new well-formed construction. At C 1 about 5 sets tracks; C 2, 10 sets. Last 2 days fairly warm (40°F.) + sunny and many mounds entirely clear of snow. One digging about 4" into soil was seen (western gp.). None seen out (to 4:20 p.m.). In

Cynomys ludovicianus

January 2, 1954. Nr. Ft. Collins, Colorado. one spot tracks showed that green Opuntia (prickly pear) leaf had been chewed - 3" long chewed edge. / Apparently, then, considerable activity around Jan. 1 at 5000' elev. but not every day.

January 3, 1954 Talked with John L. Retzer, soils man of the Forest & Range Exp. Station, concerning soil and rodents. He was very much interested in my problem. He could see no possible harmful effects and some possible good effects of rodent workings. The important soil features for which to look are texture, slope, and impervious layers, such as hardpan, in his estimation. He would be interested in working on soil in C. l. colonies personally in the field as well as in his lab. (There are many excellent soil men at Colo. A & M., in S.C.S. and in Agronomy Dept.). // In afternoon drove with V. B. Scheffer to the prairie dog town near (across) Wellington. Only a few patches of snow remained there. Charlie and at least 10 other C. l. seen. I took several photos of an immature that was even tamer than Charlie. This one ate whole corn that was thrown near to it & could be approached to a distance of 10'. Shallow holes about 2" deep dug at many spots near burrows as if digging for some sort food (no remains found). While Vic was photographing Charlie, who was a third out of burrow, C. set up a series of barks, increasing in speed, and followed by an internal grunt. Many burrows, some showing many fresh tracks, up to 100 yds. W. of the

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(12B
12C - list of colonies 1936 on Central Plains C/Sp. Range)

Cynomys ludovicianus

January 3, 1955 Nr. Wellington, Colorado.

S. fence of the preserve (= horse pasture). Ground there with almost no cover at all - bare soil. Apparently on heavily overgrazed pasture. Clear & sunny but fair breeze & hands soon numbed if not under cover (40°F.?).

January 4, 1955. Weld Co., Colorado.

"Woody" Williamson, project manager of Land Utilization project having headquarters Briggsdale, told me ~~that~~ the project formerly had a man who spent full time on rodent control. County agent has little to do with it. A F&WL man, Crouch, working out of Brush, does work now. There was a large prairie dog town on land of Cecil MacIntosh (a town ~~over~~ running thru 2 sections) that was poisoned last year. Gus Anderson, Mr. Sprague, & James Lawrence also have some prairie dogs. Harvey Pollock said he had one lone one, now somewhat of a pet, & he wouldn't trade it for a lot. MacIntosh, Pollock, & Calder are the principal old-timers in the L.U. region. I met most of these men. They had no hard feelings about prairie dogs, principally because they were mostly gone thru poisoning. A few were interested in them. Much worry about prospects of grass in 1955 as old growth used up in grazing in 1954 when rainfall low (= increase C.I.?).

January 6, 1954. Nr. Ft. Collins, Colo.

About 3:30 p.m. I visited Spring Canyon Dam colony where many tracks in snow Jan 2. ~~Calo~~ About 4" light snow. This had fallen as wet snow night of Jan. 4-5. None fell after noon yesterday; over 24 hrs. ago. I went to both groups of mounds & (see p. 13)

Cynomys ludovicianus

January 5, 1955 Weld Co., Colo.

Copied location of prairie dog colonies shown on maps prepared of Central Plains Exp. Range area in summer 1936. Land was classified as annual grass, grama - buffalo grass, Russian thistle, weeds, or cultivated. C. l. mostly in grama - buffalo, but Russian thistle where noted.

T 9N, R63W.:	None
10 - 63	Sec 11, S edge of SW 1/4.
	14, N edge NW 1/4.
	30, extreme SW corner.
	27, " SW corner (overlap Russ. thistle)
	34, extreme NW corner.
8 - 64 (inc.)	5, center N. 1/2. (only secs. 4-8, 18, 19, included.)
9 - 64	16, SW corner & S edge SE 1/4.
	19, S edge SW ~~cor~~ 1/4 of SE 1/4 (in Russ. Thistle)
	20, N edge of NE 1/4.
	21, N edge NW 1/4. Center NE 1/4.
	29, N edge NE 1/4.
	30, N edge NE 1/4.
	31, N edge NW 1/4
	32, center SW 1/4
	36, N. edge NE 1/4
10 - 64	13, N center of SE 1/4.
11 - 64 (inc.)	28, center SW 1/4. (only S. 16-21, 26-30, 31-36 incl.)
8 - 65 (inc.)	None (only strip of 2 eastern secs. surveyed)
9 - 65	None (S. 27-34 omitted).

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January 5, 1955

T R
10 - 65W Section 8, center SE 1/4. (half in Russ. thistle).
9, center SW corner (Russ. Thistle)
29, S edge NW 1/4
11 - 65 (inc.) 27, center S 1/2. (only strips of 2 S. secs. surveyed).
11 - 66 (inc.) None (only sec. 36 surveyed).

The plats with maps in ARS office of G. E. Klipple. Overall plat might show up relation to slope or drainage. Poisoning has effected distribution.

Cynomys ludovicianus

January 6, 1955. Nr. Ft. Collins, Colorado.
found a few tracks atop the mound of 3 only; these 3 were marked with stakes. Apparently C13, C7, and a small mound 31 yds. E. of M6. Tracks of a large dog (*Canis*) visited several burrow mouths. No *C.l.* activity at many holes that had tracks before. None connecting burrows on surface.

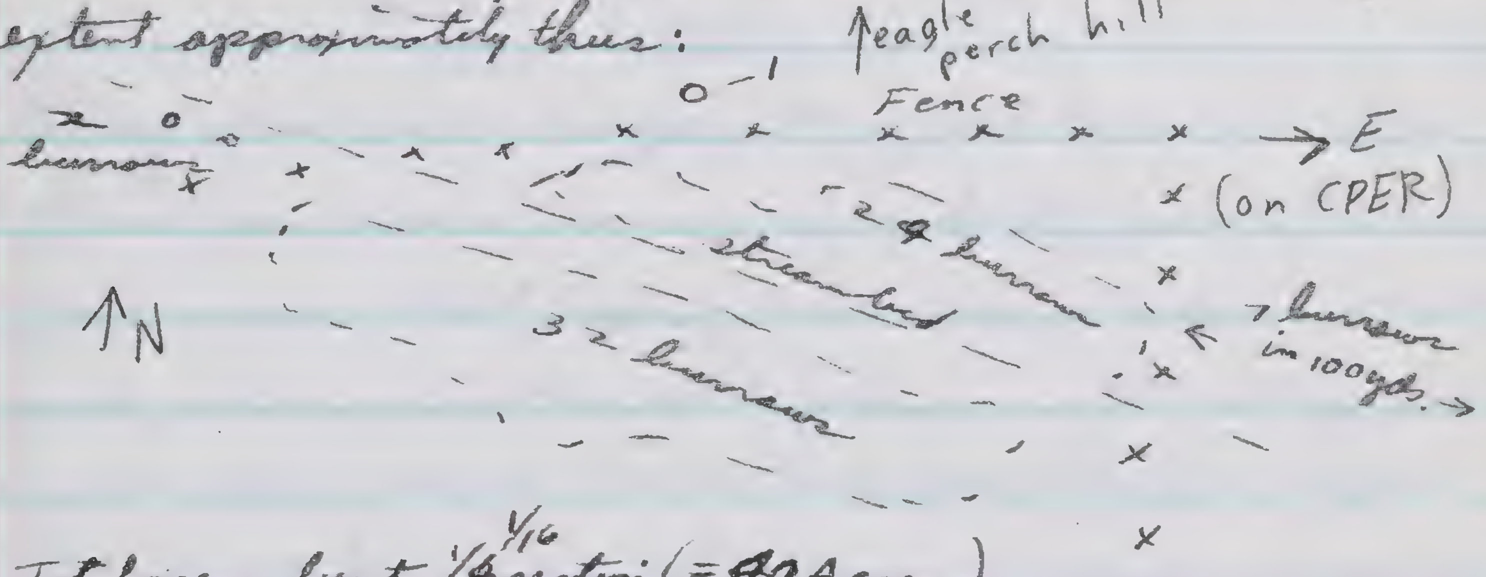
January 8, 1955. At about 4 p.m. visited Spring Canyon Dam colony. With exception, crater burrow about 50 yds. NW of C13, no new prairie dog tracks at burrows. Many more rabbit tracks than Jan 6. Cold & partly overcast today; probably < 30°F. all day. Apparently stay underground for at least 3 days when cold after snow storm. [Weather remained cold; somewhat warmer Jan. 11, 12, but <40° max.]
Paul Baldwin told me he saw large colony near U.P.R.R. near Cheyenne in late December.

January 12, 1955. 8 mi. N. of Nunn, Weld Co., Colo.
Visited colony that D. C. Klipple had showed me on Central Plains Exp. Range. Colony in NE 1/4 of SW 1/4 of Sec. 22, T 10N, R. 66W. This 1/4 section fenced on N & E only. Streambed runs thru it (NW to SE) and colony along slopes N & S of streambed, which has flat bottom. I walked about to ascertain limits of colony and counted >6 burrows or mounds. Some holes filled so not open. Many open & possibly used by rabbits or *C. l.* No definite *C. l.* tracks (Cold - 35°F - & fair breeze). About 10% ground bare, the rest variously covered with windblown snow. Many *Lepus* & apparent *Sylvilagus* tracks but no definite carnivore tracks.

Cynomys ludovicianus

January 12, 1955 8 mi. N. Nunn, Weld Co., Colo. (3 p.m.)

I was on the ground 2 to 4 p.m. A golden eagle perched on a small rockpile atop a knoll about 200 yds. N. of N. fence line. At ~~sige~~ site of perch I found J Lepus remains and about 6 casts (These can be analyzed for Cynomys content). Saw 2 eagles at same site at 1:30 p.m., & another 1 mile distant eating a Lepus. Saw 2 Buteo lagopus in area. Many mounds of harvester ants in C.l. area. One old ant mound at edge C.l. mound & another ant mound had apparent C.l. tunnel into it (C.l. eat ant grubs on occasion?). The ants considered a range pest here (studies being made at Colo. A+M.). C.l. colony extent approximately thus:



Total area about ~~1/8~~ 1/16 section (= 40 Acres).

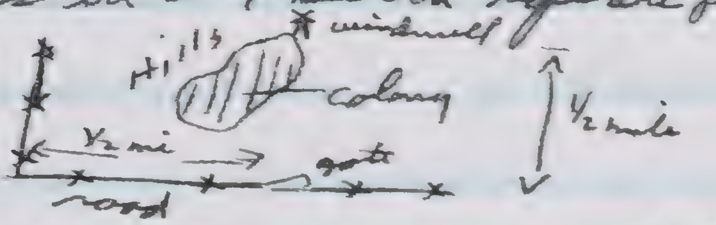
Most recently active burrows may be at NW (upstream) end – some are. Fence line gives good marker for near limits colony – but have crossed fenceline. (Possibly can find adjoining pastures with much diff. usage & compare C.l. population. In the colony E. of Wellington, perhaps 1/4 on ~~smooth~~ heavily grazed ground just N. of protected area, but colony moving? – and which way?). About 300 yds. N. of center of fenceline, eagle perching knoll where view of most of colony

Cynomys ludovicianus

January 12, 1955 8 mi. N. Nunn, Weld Co., Colo.

excellent. Several Aquila casts found there.

January 13, 1955. Old burrows, or those of other rodents, may be enlarged & used by Lepus townsendi, judging from tracks & droppings near low mounds & burrows. // I walked from Central Plains Exp. Range (C.P.E.R.) headquarters thru sections 18+17 (R 65 W) but saw no definite Cynomys sign. // Mr. ~~Agro~~ Prange, who has ranch just N. of CPER, said one colony on his ranch poisoned last year but that there was another in section 33 (T 11 N, R 65 W). I visited this. It was in a 4 section square pasture, thus:



Colony about 600 × 400 yds. Many old burrows. None showed recent work or use since last snow (Jan 5 a.m.). Some on near level ground; most slopes about 5% & prob. none over 10%. Whole group on SE side of low gentle ridge. About 3 miles to N. were bluffs & cliffs that should be good for hawk & eagle perches & nests. I saw 1 Lepus townsendi on colony & shot it - it died in a burrow (old C. l. burrow?). This entire colony can be seen from hills near it. Good for study. Fairly good ground cover (buffalo grass mostly), not bare ground, & nothing over about 6" high. No shrubs. Good for study. Reaches to within about 200 yds. of road. Various sized & textured gravel mixed in soil. / 4.1 miles west of Pierce was a section (±) on S. side road where many large mounds. This apparently

Cynomys *ludovicianus*

January 13, 1955   Nr. Pierce, W. Weld Co., Colo.
the very active colony that Lee Dono (thesis, Colo. A+M) used for censusing cottontails. I saw a cottontail & many rabbit tracks (nearly dark) in passing.

January 15, 1955   Laramie, Wyoming
Talked with Reed W. Fautin, Zool. Dept., Univ. of Wyoming & told him of my plans for study of *Cynomys* ecology. He seemed to think I was on the right track & offered to visit my study areas with me later in the year. He gave me assurance that I was in a good spot for study as predator & rodent control very rigorous in Wyoming because of pressure of sheep men. In Wyo., only *Cynomys leucurus* in Laramie area, but probably *C. ludovicianus* near Cheyenne & eastern (Lusk area) part Wyoming. No recent surveys *C. l.* made in state so precise limits distrib. unknown. He thought comparative reproductive success in different sized colonies would be good angle. Relation with herbage, soil, & water (in soil) important. I was gratified to get assurance that I was working along a reasonable line. Really got no new ideas.

January 18, 1955   (Weld Co.)   Briggsdale, Colo.
Jenkins, postmaster, has airplanes. He sometimes sees *C. l.* towns from air. He told me of one 3 mi. W. 2 S. of Briggsdale (E. of silver house) where he saw some last summer. J. seemed intelligent & interested in my work.
Talked with W. E. Williamson, in charge of Land Utilization project. He had been here less than a year. He told me of approximate location of 3 *C. l. towns*, two prob-

Cynomys ludovicianus

January 18, 1955 Briggsdale, Weld Co., Colo.

ably poisoned last year. One at MacIntosh place (T9N, R64W) near Prairie View School, another near that (9-63, Sec. 30). / Dave Cranch of Brush (E. of Greeley) did control work (F & Wildlife Service). / Another town north of Stoneham (Sec. 24 in 9-57, or Sec. 25 in 8-57). Town just below sedimentary outcrops. / Jenkins said much poisoning by W.P.A. (or some such) in Colo. Willard Frank, oil man, & wife (native of Briggsd.) both here 20+ yrs. ago; interviewed. Mrs. most observant & ~~reliable~~ reliable, it appeared. Formerly C. l. everywhere including flat ground. Poisoned extensively. They rather liked C. l.'s & also hawks, eagles, coyotes. Said most people here now did not persecute eagles or coyotes. They told me of C. l. town of about 40 A. above (sometimes) 80 A. lake about 2 mi E., 2 mi. N., 1½ mi. E. of Briggsdale on the Lin White place. (I could not get to because of snow). He mentioned that formerly many on Cash (spelling?) place on Crow Creek (to S.?). ~~They~~ He commented on large number badgers now, & jackrabbits. Hawks & eagles about same nos. as many years ago. Antilocapra perhaps more numerous now than many yrs. ago. / The area of towns known by Williamson near Wild Horse Creek are in about same area as 1936 towns in past survey (by USFS or SCS).

January 19, 1955. A letter from W.C. Ernst, Douglas, Wyo., told of prairie dogs on ranch of Herman Werner, Ross, Wyo. Said saving it from hunters & poisoners. Another - 15± mi. E. of Douglas on ranch of Henry Reese, Jr. - has one or more albino dogs.

Cynomys ludovicianus

January 19, 1954 Weld Co., Colo.

Isaacs says he saw 4 albinos in one burrow. / Mr. Henry Prange (ranch just N. of CPER), said colony on Sec. 33 was poisoned last fall (+ previously). Another old colony about 1 mile N. of house (nr. fence + draw). Another in sec. 31 nr. windmill (no blades). Prange seemed little interested wildlife but tolerant of my questions. / Visited Art T. Depörter, rancher living ½ mile S. of Rockport on E. side highway 85. He had lived in this region 46 yrs. About 1922 they had an assessment of 15¢ per acre for poisoning operations. (No kit foxes seen since). As to movements C. l. colonies, he thought they went where the feed was good - sometimes in one direction, then back again toward old town. C. l. on slopes, not near bottom or top of ridges, mainly. He thought they dug very deep - when digging for silo one burrow went down about 30 feet, in steps (could be other origin?). Formerly C. l. were nearly all ground. Grass no shorter now than when he homesteaded here in 1911. (Then every other section open + everyone grazed on it; 2 to 4 families per section so grazing heavy). About 1920 land owners allowed to take additional whole section. 1911-12, grass very short. Many badgers now; fewer hawks + eagles; few coyotes but coming back; jackrabbits increasing since 10 yrs. ago. Art said C. l. head for green feed. Tend to be low on slopes, in clay soils (not sandy). / ~~C. l. are~~ He

Cynomys ludovicianus

January 19, 1955 Rockport, Weld Co., Colo.

told me of someone (friend?) seeing prairie dog running down road far from colony. He thought 1 or 2 may have come onto his ranch last year from colony about 1½ miles to N. (on Acor's place). / Visited C. C. Acor, old-timer living in shack 1 mi. N. of Rockport. He had about 40 A. colony near his shack + another 10 A. over hilltops to W. Some burrows across fence on property to S. He had poisoned most of colony last year (strychnine in oats) except for near house. Burrows looked unused by C. l., but many *Sylvilagus* + *Lepus townsendi* using. I found definite C. l. droppings on burrow ¼ mile S. house (1954 use?). Still some snow on ground + I searched for tracks. One group of 6 burrows NW of corral 100 yds, on 50f-5% E. slope, were connected by tracks, + I saw one large one out on burrow, flicking tail often. He went in when I approached to 150 yds. No call heard. Temp. about 35°F. (estimated) + cold breeze; partial cirrus overcast. Acor thought they hibernated. He liked cottontails + C. l. near house. (Most people I have talked to would like to see a few around). / The tracks showed that C. l. visited small spots where snow melted away from ground - only very short dry grass (¼") or plant stubs available. (Acor did not mind trapping or shooting away from house.). // At Jim Lawrence's place near (SW of) C.P.E.R., I looked at colony on gentle slope, some flat, ¼ mile NW of his house, between corrals + creek bottom. Holes rather far apart, I thought. Little ground cover. This

Cynomys ludovicianus

January 19, 1955 W. Weld Co., Colorado.

had been poisoned 3 or 4 times in past. Each time a few survived, it seemed. As yet had not crossed to W. of creek bottom (dry now). Much snow but mounds clear. I saw Lepus townsendi but no tracks Cynomys. Perhaps still present. Lawrence leases SW 1/4 of Sec. 22 where there is colony but he did not know about it. Land is turned over to association for use. He was willing to let this go until I was finished with study. / Dave Crouch of Brush apparently does all poisoning in Weld Co. (Fish & Wildlife Service). Cold wind by 4 p.m. near Nunn. / Acox said he had heard of colony near Antelope Hills near Pierce (NW of?). In evening I talked with Norton Miner of Ft. Collins. He was Fish & Wildlife man who trapped predators & poisoned rodents for last 2 years. People wishing control notified Co. Agricultural Agent (Don Mc Millen) who notified Miner. Part of funds from S.C.S. W. J. Kremer (now lives 1/2 mi. N. of Ted's Place (9+ mi. NW of Ft. Collins) had been leader in starting vigorous C. l. control in 1951. Bohart preceded Miner as the poisoner. Miner gave me a list of people who had complained about C. l. 1953 & 54. He showed me on Larimer Co. map areas having dog towns in 54. Towns ranged from Longmont to Wyoming line. Largest colonies near road to Laramie between ~~Dea~~ Deadman Butte & Virginia Dale. These about a section in area. Many on Warren Live Stock Co. land in NE corner of county. Colonies N. & on E. side of reservoir 5 mi. NNW of Waverly. A good colony on E. side of ridge on E. side road

Cynomys ludovicianus

January 19, 1955 Larimer Co., Colo.

about 2 miles before road reaches The Forks. Prominent colony sec. 31, 5 mi. SW of Lake Loveland. Two (NW one not treated) 2 mi. SW of Lonetree Reservoir near Loveland. As to variety of soil & moisture, some in fairly rocky ground where blocks limestone (last mentioned?). One in bottom slough (1 mi NW of Boedecker Lake). In all Minor told me of about 30 towns of varying size, largest covering perhaps 1½ sections. About half towns were obviously near a stream, lake, reservoir, or drainage ditch, indicating some correlation with moisture (a certain stage in vegetation?). Minor also noted C. l. not on tops of ridges. He said that using 1080 poison on rolled oats, few C. l. die above ground. With shooting too, ~~few~~ most get down burrows. In poisoning every burrow treated; yet, 2 weeks later, remaining C. l. all in one portion colony (gathering together of scattered wide?). Some seem to escape poison annually. (Crouch has had longer experience so should know more about this). Mounds on Tony Ramon place especially large (2 mi. E. of Round Butte in T 11 N, R 68 W. Minor very cooperative & pleasant. He is wildlife student at Colo. A&M. He said he has seen no ferrets, & not many C. l. holes that have been dug into by badgers. / Deporter said they repair mound soon after road scraper scrapes it away. But he says they move out when land ploughed in area around; due lack food. / Minor said one colony near alfalfa. Cut strips in edge alfalfa but did not burrow in the alfalfa.

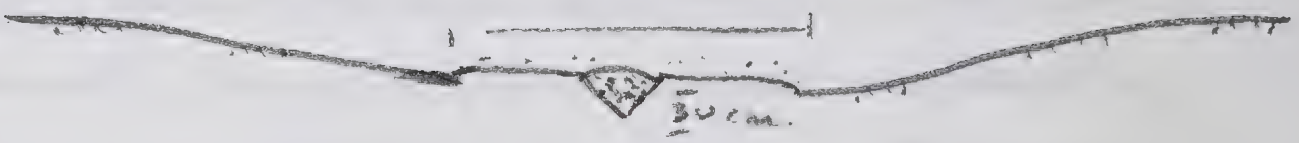
Cynomys ludovicianus

January 20, 1955. Ft. Collins, Colo.

Called on C. Till of Game & Fish Dept. this region (clear to E. edge state). He friendly, intelligent, cooperative. (A Helmut Buechner student ~~his assistant~~). He told me about colonies in N. part county, in or near Antelope Refuge (State; started 1922; no special management, just a closure on private & school lands) that Miner had already noted for me. But he also told me of locations eagle nests that area. He said he had looked in nests searching for antelope remains & had found prairie dog remains. Nest near Tony Romani's had brought off 3 eagles one year.

January ~~23~~ 24, 1955. Larimer Co., Colo.

Light snow last night. About 1 p.m. arrived at colony about 2 mi. E. Wellington. Searched for carnivore & *Cynomys* tracks. Only *C. l.* track at burrows where Schaffer & I photoed one there several days ago. Tracks connected 3 burrows; about 10 lines of tracks connecting two about 20 yds. apart. Tracks probably made today. No carnivore tracks found except one possible coyote. (Wind blows over tracks soon so probably do not last well defined for more than a day in loose snow). Tracks showed ~~that~~ *C. l.* had apparently nibbled at bases of short *Chrysothamnus*. (one coccinellid beetle found there too). Apparently only occasional individual out on cold January days (probably not over 35° all day). No tracks in area inhabited by "Charlie." One *Circus hudsonius* seen near by. // Drove to site of colony in Sec. 29, T10N, R68W., 1½ mi. NE of Boxelder Res. No. 1. This poisoned, apparently off


30 cm.

Cynomys ludovicianus

January 24, 1955 Larimer Co., Colo.

activity, by Norton Miner in 1953. Gently rolling grassland. No rock outcrops. Most burrows in one draw about 1/4 mile wide. Colony in section about thus:

Many harvester ant (Pogonomyrmex ?) mounds this pasture. Grass about 3/4" high, dry. Ground hard. Soil of mounds with much gravel. This gravelly soil covers circular area about 10' diameter & has no apparent vegetation. Burrows here wide spaced - average about 50 yds. apart. Mounds only about 12" high (due cattle trampling ?). Are conditions favorable for mound ants also favorable for C. l.? This property apparently that of Mr. Von Vihl of Ft. Collins. Max. slope with burrow about 10%. Some on flat but most on slight slope. No brush or bunchgrass cover. Good area to study ~~snow~~ physical environment & burrow spacing. // Drove to vicinity of tipple on U.P.R.R. to vicinity of reservoir on Dry Creek (Sec. 33, T10N, R. 69W. N. Miner told me of towns ~~Supposed (Miner) towns on~~ on Wedman land near there. I did not find them but rolling land along creek appeared favorable. Grazing had apparently been ~~favorable~~ heavy. I drove to Owl Canyon & thence to Ft. Collins without seeing more C. l. burrows.

January 23, 1955. Nr. Ft. Collins, Larimer Co.

Visited area of burrows in wide rounded draw ~~on~~ near center line between Secs. 3 & 4, T 7N, R. 69W., just W. of County dumps, to land leased (?) by Ross of Ft. C. Many burrows in bottom & extending up foot of bordering slopes. As slopes increase, soil thinner & more & larger rocks.

Cynomys ludovicianus

January 23, 1955 Nr. Ft. Collins, Larimer Co., Colo.
I saw no fresh appearing burrows or C. l. tracks. No brush, tall grass, boulders, or other cover. This drains into Fossil Creek. Has earthen dam at S. end of draw. No coyote sign or badger sign. (One burrow at Wellington of badger size but old).

January ~~25~~ 25, 1955 Partly overcast but no wind so rather warm in afternoon. At 3:30 p.m. I visited Spring Canyon Dam colony (Sec. 33, T7N, R69W) and saw 3 prairie dogs out. Two at one burrow of E. group; one near NW edge colony. Examination of snow revealed many tracks, some having been made in on hard snow (barely sink in) & others on softened (sink deep). Spaces to 10 yds. apart between snow patches but general aspect about 9/10 snowy. Tracks near some burrows S. of fenceline where I had not seen them before. Apparently much activity on warmer days. No fresh construction apparent tho melting snow, wet ground. Mounds of (many) had fresh scratched appearance. Not obvious what eaten. Opened cockle burrs (Xanthium) near burrows, but burrs very common that area. Used burrow had obvious quantity of droppings scattered near it. Rootstocks of Buchloë seemed to be eaten. No green food apparent. Probably could trap some here on warm day. I visited group of mounds 1 mile NW of this colony — Sec. 29, SE¼. These in wide rounded valley leading N. toward Dixon Res. I found no signs activity but did not visit northern half of colony. Soil had fine rock & was dark (near black) in color with fine texture. Heavily grazed pasture. Some

Cynomys ludovicianus

January ~~27~~ 25, 1955. Nr. Ft. Collins, Colo.

Opuntia close to burrows. One area apparently formerly part of colony had been ploughed. On black soil, one mound of red subsoil stood out strongly. Surface mounds caked & cracked so apparently few rabbits.

January 26, 1955. Talked with Milton "Pat" Ferree who lives 3 mi. NW of The Forks (NW of Ft. Collins on road to Laramie). He had colony of about half a section, mostly in Sec. 1, T10N., R71W. He thought this colony an old one & spreading ~~upstream~~ up draw. He had poisoned it with strychnined grain last year but without a good kill. Formerly lived in S. ~~Colo~~ Colorado (Kiowa & adj. county) & said many Cynomys there but eliminated by 1080 poison (he talked as if he had personally used 1080 there without Fish & Wildlife personnel). He & wife pleasant & friendly tho apparently anti-S.C.S. I drove to the colony and saw C. l. out on mounds & running away in alarm. I saw up to 3 together at one burrow & as many as 5 out in one small group of burrows. I saw the first few upon arrival, at 10:45 a.m. Only a few small patches snow left here. Some used burrows floored or lined with packed dirty snow. I set live traps baited with whole oats at 4 holes & steel traps at two where I saw C. l. go down burrows (none captured by 2 p.m.). One pair alarmed by car ran to top of burrow & one gave the straightening up display twice. Steel traps put inside burrow where 2 went down, but none caught. I watched one feed, pushing its nose under edge of ~~Bu~~ Buchloë tuft (almost no stems left because close eating earlier or grazing). Another

Cynomys ludovicianus

January 26, 1955

pushed nose under edge prickly pear leaf. I found some fine green grass leaves under *Opuntia* leaves (*Bouteloua* ?), these the only apparent greenery. They scratch 4-5 X with forefeet, alternately, then feed at spot - evidently digging for food (about 1"). (Two shot had green fragments in mouth. Stomach contents one shot three stomach were green too). I shot 3 in all & kept them for examination. These were about 2' from burrows when shot with .22 hornet; they did not move more than a few inches & were unable to make strong attempt to get to burrow. This town mostly in SE 1/4 of Sec. 1 (R. 71 W.), overlapping 100 yds. E. into Sec. 6. Downstream (S.) colony limited by very rocky ground (scattered junipers; rare yellow pine; a shrubby Cercocarpus? *Quercus* (?) near & between rocks). Colony on gentle slopes, up to about 15% slope, on open ground. Many close to numerous rock outcrops of 10-15' height. Burrows reach N. to 200 yds. from crest of hill; why not to crest? Crest rockier than lower down & soil probably thinner. Grass cover the very base of short grasses with considerable spaces (to 6") between tufts. At some sites ground cracked. Red soil for most part with moderate gravel mixed. To W. a lower broader crest; a few burrows to W. of this but apparently not active. To E. & W. ground apparently suitable for spread, especially to W. where occasional bare spots in grass. I saw no rabbits but, ~~att~~ saw tracks in snow that appeared

Cynomys ludovicianus

January 26, 1955 NE Larimer Co., Colo.

to be cat (wild?). I found 1 coyote scat (sound) near burrows. No ~~always~~ obvious hawk or eagle perches on rocks (that is, no excrement). Considerable amount Opuntia, & this even on mounds but apparently not eaten in spite scarcity greenery or foliage. (Grass under cactus leaves not available to cattle; same may be true of grass under bushes taken by C. l. – they remove bushes + expose grass). No evidence cutting oak shrubs near rocks; & Took one photo from near center Sec. 1 facing SE. Shooting sound apparently not major alarm. I shot one (#1) from car; walked to it & carried it to car; then saw another out + feeding (#2) only 100' distant. When #3 shot, another was half out of burrow near line of fire & toward me – it went no lower in hole! / Lloyd Holsten, rancher & keeper of Red Top Station, told me of C. l. in vicinity. One group near line between Sec 16 (owner Starke) + 21 (owner Ernest Roberts of Livermore) bordering NE ¼ of Sec. 21. ~~is small~~ These overlap into NW corner Sec. 22. Another group, small, on Sixmile Creek in SE corner Sec. 22 (owner Maxwell). Some of these have been poisoned in past. One group 6± burrows has not spread in sev'l years. (Lloyd will let me in to investigate these any time). On Holsten land on Sec. 9, 2 miles SSW of Steamboat Rock, a small group burrows first seen 1954 } Sec. 9. Holsten thinks C. l. ~~go~~ migrates at least 4 or 5 miles to establish new

Cynomys ludovicianus

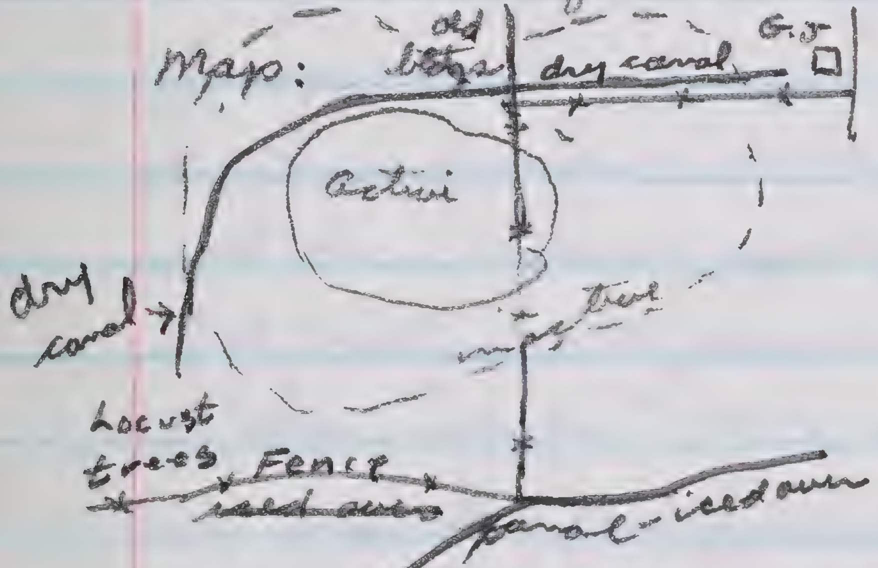
January 26, 1955 NE Larimer Co., Colo. colonies. Holsten formerly leased ranch in the "Rawhide" area (to E., nr. Boxelder Creek, near Rudy Ackerman's). He said that C. l. not then remembered to be a pest. But many (75±) coyotes trapped there (he had sheep) by one trapper. Holsten said some coyotes (few) & few eagles in this (Red Top) area. Many eagles on Cox & Eagle Rock ranches (E. of Rockport) Holsten said. L.H. said he favored some coyotes for rabbit control, & liked to see & hear them. Mr. Stark, who had land in Sec. 16, did not poison C. l. but liked to shoot them. L.H. looked on this as lack cooperation. It is general feeling here that concentrations of C. l. are nuclei for spread to other ranches (probably correct). // Where the Laramie road (#287) passes entrance to road W. to Halligan Reservoir, C. l. burrows numerous on W. side of road (any on E. side? E L.H. says no, altho he has seen them feeding along W. side road). There C. l. in NW corner Sec. 31 (T10N, R70W) & adjacent areas to W. & NW according to Norton Miner. I saw burrows below a rock & earth dam (no water in resv.); too cold to search further - no burrows near road appeared to be active. This was on F. A. Lewis land, now leased by a new man this area. / All 3 C. l. shot were ♀♀ with slight tooth wear, much fat, good coat showing no molt line, no repro. activity, stomachs & caeca well-filled. More ♀♀ out than ♂♂? Imm., more easily shot? One flea collected from one. No parasites, ecto. or endo., found, [illegible].

Cynomys ludovicianus

January 28, 1955 Nr. Loveland, Larimer Co., Colo.

Searched ~~in others~~ for a town of which N. Miner told me, about 1 mi. NW of Boedecker Lake. Found large Geomys (?) burrows but no C. l. Loose fine silt dark soil there. Reached Issy Jordan ranch in Sec. 31, 6 mi. SW of Loveland, about noon. Jordan, about 60, did not like C. l., hawks, or coyotes. He still had two bunches C. l. tho he had poisoned them once & Miner had also. He said the C. l. were getting into his ploughed fields now. He had son who lived near school at county line to S.; many C. l. there, he said. People from town came out to shoot C. l. He readily gave me permission to shoot too. I visited but one group — about ½ mile W. of his house; probably in SW ¼ of Sec. 31.

Map:



To N., a ploughed field. Apparent old burrows near S. edge (possibly other rodent burrows dug out by badgers or rabbits). One field to SW of house & another to S. of active part colony were ploughed but dry. There had apparent C. l. burrows but none appeared typical — several had been bored out by badgers; others probably opened & kept thus by Sylvilagus. Holes 50 yds. out in loose ploughed ground. Near holes some shallow diggings as of C. l. looking for food. Probably much of blame of C. l. for burrowing in ploughed fields should go to rabbits who open up burrows — check this. Do C. l. open

Cynomys ludovicianus

January 28, 1955 Nr. Loveland, Larimer Co., Colo.

burrows & live in the ploughed field? (Also smaller burrows as of Geomys in ploughed ground). At about 12:30 I saw 11 C. l. out. Some atop mounds (2 or one), some foraging or running. The active part of colony is an open stand of Atriplex canescens. Bushes to 4' high. Some burrows against these bushes & bushes not cut down. Apparently no recent cattle grazing on this 40 as some grama stalks 12" tall. I took 2 photos this area. Some mounds large. About 5 of perhaps 50 had been dug into by badgers. Mound scattered & hole bored about 12" diameter. I found no badger scats. Two burrows went down alongside fenceposts so as to make post loose. Several were in the mounds (8-10" high, 1½' wide; covered with dense basal part of tough grass, about 3" tall) that seem to form under wet conditions. Why in these mounds? At S. edge colony old burrows in area that had apparently been inundated for ground & burrows were salt crusted. It seems that C. l. get as close to water as possible without getting too close for burrows to be flooded! Check this. Advantage of wetness is green vegetation. All around active part of town was a belt of 100 to 200 yards of inactive burrows (insect poison?). About 150 yds. to W. was uncultivated but thin stand of Bouteloua gracilis with old burrows near. 3/8 mile S. of colony & at 10' lower

Cynomys ludovicianus

January 28, 1955 Nr. Loveland, Colorado

level was small lake surrounded by dike so sometimes much larger. I saw one Circus hudsonius & 2 Sylvilagus near the colony. In active part slope was about 2%, to S.; but in inactive part N. of dry canal some burrows were at top of a 30% slope on slope of 15% (some doubt if certainly C. l. burrows). Old burrows N. of active part, across dry canal, to W. of old buildings. I set 3 live traps near burrows where one went down but in one hour got nothing (using collapsible 8"x 8" x 24" welded wire traps; Nat'l Live trap Co., Tomahawk, Wisc. John King says these worked at Wind Cave). One dog let me walk up to a distance of 100' before going down hole. It gave rapid series chirps as I approached. I parked car 50 yds. from another. It froze, head & rump visible to me over mound top, & remained almost motionless for about 20 min. until I walked toward ~~it~~ it. Half hour After I set traps, I saw only 2 above ground (these not near where I had walked). I think that in winter they spend little time above ground & may stay down a long period, or the rest of the day, if alarmed. This colony deserves at least a day of work to study variety of mounds & burrow placements & relation to vegetation. I did not visit another, older, colony to north of this one (prob. also in sec. 31, in NW 1/4). // I drove then south to Carter Lake road & looked for C. l. in Section 18 & 19, 2 mi. S W of ~~Loncel~~ Lonetree Reservoir, where N. Morris had told me of C. l. The S. 1/2 of Sec. 18 unfenced. I

Cynomys ludovicianus

January 28, 1955. Nr. Loveland, Colorado.

found about 30 burrows on W. side of a streambed. These on nearly level ground. Cover of *Bouteloua gracilis* (sparse between four inches to a foot) and small low *Chrysothamnus*. Slight slope. Several burrows had been dug out by badgers. None appeared to be active – caked surface mounds; no fresh droppings. I did not visit NE corner Sec. 19 where Miner poisoned some. // The Jordan ranch showed extreme depletion of forage in area of *C. l.* burrows. No herbage at all for many paces. The active colony may have had no grazing last year. // Some burrows at Jordans ~~[illegible]~~ had mounds of loose shale flakes, about 3/16" thick ~~x 1" to~~ and 1½" long maximum; pure *shale*, no fine soil mixed. Some other mounds contained rocks up to half-fist size; apparently *C. l.* dug these up.

January 29, 1955. NW Weld Co., Colo.

Near Rockport on C.C. Acox ranch I saw 2 out, about 100 yds. NW of corrals, about 11 a.m. Overcast, mod. wind, & about 40°F. This area heavily overgrazed – only widely separated basal parts *Buchloë* in most of area. I searched large town on Prange's Sec. 33 but saw no *C. l.* Same luck on Sec. 22 in C.P.E.R. This last apparently cleaned out [no – very active!] without knowledge of Jim Lawrence (leaser) or Klipple (~~by [illegible]?~~). // I looked at burrows & mounds on S. side road 4 mi. W. of Pierce. Saw no *C. l.* or tracks. Man living across road, 10 yr. resident, said these poisoned 2 yrs. ago ('53?) and no dogs left he thought. This land very heavily overgrazed. Soil silty & dark grey & with

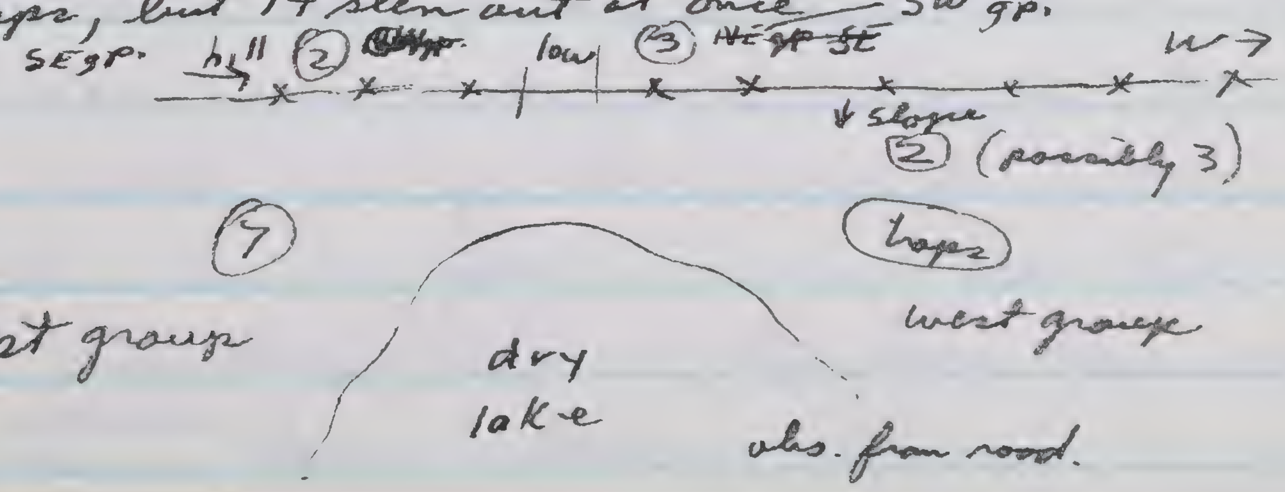
Cynomys ludovicianus

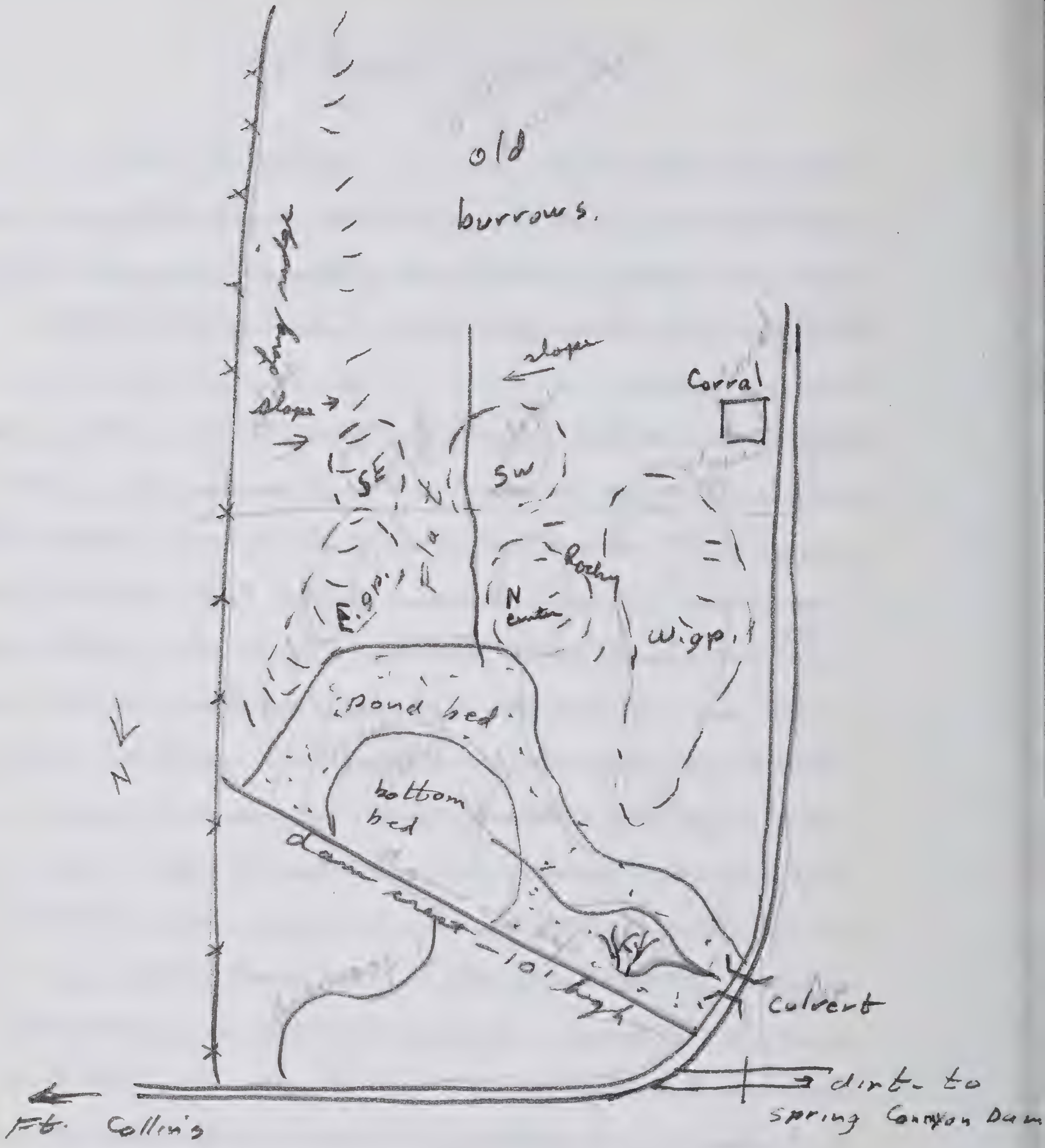
January 29, 1955 Weld Co., Colo.

so little cover probably would blow readily. Colony on 5% slope of W. aspect, on both sides of ~~[illegible]~~ old irrigation ditch. (Belonged to Dr. Cross of veterinary school of Colo. A&M.).

January 30, 1955 Nr. Ft. Collins, Colo.

Half overcast but windless. Went to Spring Canyon Dam colony. I saw at 10:30 a.m. 13 prairie dogs out on area of 300 x 100 yds. Most N. of E-W fence. I set 5 live traps near 4 burrows where I saw C. l. All set by 10:~~4~~20 a.m. I walked away from them. Half an hour later about 4 had come out 200 yds. E. of where I set traps. At 11:10, 2 out about 50 yds. W. of where I set traps (in W. gp. holes). 11:20, 3 out to W. of traps, ~~4 about~~ 4 out N. of fence in E. group, 2 out S. of fence in E. group; none out close to traps. Traps were set by burrows. Wary of these? – so come out other holes or stay in? ~~[illegible]~~ Probably stay in – only 2 out in trap region at 11:45; 6 out (4 N. of fence) in E. group at 11:45 – so not all out yet. Overcast 8/10. Magpies constantly heard in trees 1/4 mile from C. l. burrows. A Sylvilagus sunned on a mound 100 yds. from the C. l. One dog foraged at edge of flat that is sometimes inundated. All are near edge of dry pond. || Departed. Returned 1:45 p.m. when sky all overcast, but calm & not cold. No C. l. in traps, but 14 seen out at once




old
burrows.
dry ridge
slope
slope
Corral
SE
SW
Rocky
E. gp.
N
center
W. gp.
pond bed
bottom
bed
N
dam crest – 10' high
Culvert
dirt to
Spring Canyon Dam
Ft. Collins

Cynomys ludovicianus

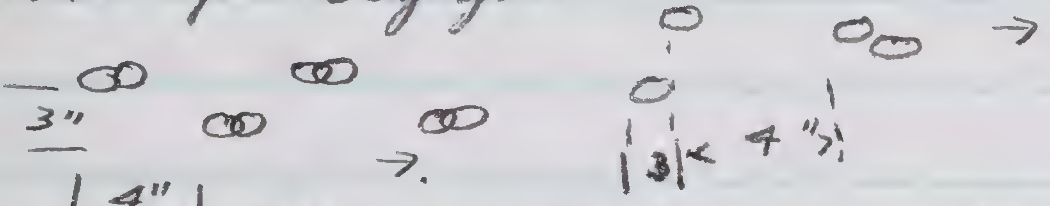
January 30, 1955 Nr. Ft. Collins, Colo.

C. l.'s paid no attn. cars passing on highway 150 yds. distant. One on a mound since morning; I put traps there 2 p.m. & quickly left. The C. l. (or nearby other) ran 20 yds. toward me & down hole (not both down, hole). ~~also~~ I watched from distant point 200' above level colony & to W. about 2:20 at least & still out in E. group (had not been alarmed by my setting traps). Three in 10 yd. diam. ~~on~~ on pond bed near edge. Two seen to go down same burrow. One seen to run about 60 yds. (from pond bed) & go down burrow. An airplane passing 2000' overhead (noisy) seemed to cause some alarm (to far to hear calls). ~~2:45, I~~ 2:45; few out. ~~saw 1 out in E group (possibly 2)~~. Calm but darkening. Light from zenith 420 F.t.c. on photo elec. meter. 2:55, 4 out in ~~W.~~ E. gp.; 2 in ~~NE~~ SW gp.; 6 total. None out in ~~N~~SE gp. Apparently some have retired for the day. Foraging day probably short in winter & perhaps dependent on weather. / This colony apparently remnant of larger that extends 500± yds. to S. of it. Pond bottom has much vegetation, apparently different from higher ground. Another apparently defunct colony of 40 A size lies 1/4 mile E. of this one (= dump col.; some dogs) in a weedy draw. 3:25, 6 out in E. gp., 2 in SW gp. None seen in N. center gp. since I arrived this morning tho I set no traps there & did not walk thru it. 3:45, two out in E. gp. One ran close by other & walked down burrow (one I had staked in snow). Other followed down. One of SW gp. out 3:45. Cirrus (ci-str.) overcast, calm, 5½°C. Now only a few patches snow left. At 4:15 none out; nor at 4:30 when sky cleared over sun but sun set on E. gp. I took up traps. No whole oat bait near holes taken. Apparently trap ~~presence~~ presence keeps in burrows. I found an area of

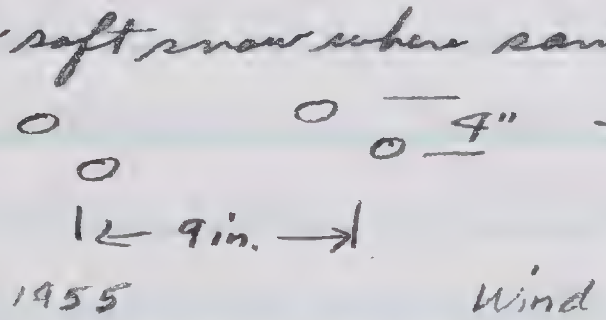
Cynomys ludovicianus

January 30, 1955. Nr. Ft. Collins, Colorado.

about 6 x 6 ft. covered with diggings to about 3" deep, apparently to get at roots (one juicy root 3/16 diam. obviously eaten off). Around some mounds tracks cover ground in all directions for 5 yds. or more. ~~Lots~~ Pond bed thick with Xanthium burrs; at some sites about 10% have been opened (probably as if by C. l. to get seeds. Tracks atop snow show wide-apart leg gait.



Claws + ~~feet~~ pads toes conspicuous in tracks atop hard snow. In soft snow where sank in 2"; tracks appeared



(possibly double prints).

January 31, 1955 Wind Cave Natl. Park, S. Dakota.

Driving from Ft. Collins to Lusk (Wyo.) saw best apparent C. l. country (most rolling, least broken) in Cheyenne region + N. to nr. Bear Mtn. // In Wind Cave Park ~~we~~ I saw several C. l. out foraging on Buffalo Flats town on highway. Supt. Semingsen friendly. He said they had poisoned prairie dogs near boundaries in accordance with Cole's recommendation. The town on SCS soil moisture site had been poisoned out + fence removed (so no exclosure now in park). Grazing intensity much reduced by reduction elk + bison last (?) year, + mov't buffalo increased by removal fences. Pasture said to show lower utilization than outside park. They had "rubbed out" two towns with 1080 poisoned grain, he said. One area near border, they had given poison to ranch-

Cynomys ludovicianus

January 3, 1955 Wind Cave Nat'l Park, S. Dakota

ers & let them do it. He had no objection to *C. l.* in parks & found them a fine tourist site (he was very proud of the interpretive prairie dog sign near Norbeck Dam town). This town now the largest one. There was no water in dam due to dry season last yr. He said that the S. Dakota legislature had sent a memorial to congress last (?) year requesting that all rodents be exterminated from National Parks lands in the state (this tied up with a Badlands boundary dispute, S. thought). Ferrets - two escaped from Senningsen's house (one later time seen by ranger in Buffalo Flats town; Norbeck town also close & could have one; one released in Shorttail Canyon town). Cahalane had favored releasing ferrets here. Barnes of Custer (F. & Wildlife) had caught the ferrets for release; taken near Midlands, S. Dakota. As to predators, E. S. said had seen coyotes recently. One man had reported 10 eagles (bald?) near where elk paunches thrown (last yr.). // In Wind Cave files a memo, dated Aug. 22, 1951, says ~~that~~ Director can now authorize control native animals in parks, if surplus or damaging vegetation (Order No. 2640, Sec. 14, June 11, 1951). In 1951 Aug., control authorized near hdqtrs. in Badlands N. M., but not yet in Wind Cave. // Harvester ants (*Pogonomyrmex occidentalis*). methods poisoning studied by List of Entomology Dept. Store up to a quart of *seeds* in nest (compete with *Cynomys*?). Number nests/A. varies considerably. Does overgrazing favor establishment? Winged forms mate & start new nests. In some areas *Cynomys*. Food for them? (ants, or rob nests).

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Feb. 1, 1955 Custer, South Dakota

Talked with Walter Hanson of U.S.F.S. who had done study on mt. goats in Black Hills. He told me of C.l. colonies near Pierre (on Missouri River). He also knew of some near Dewey, in S.W. S.Dak., near Elk Mtn. (old town too that area). In Custer area few left because of long poisoning. Local control men of F & WL Service were George Barnes and Archie Howe of Custer. The USFS attitude toward C.l. seemed to be to get rid of them. // I visited "Hoot" Gibson, county agent, to find location of Barnes. Gibson knew little of rodent & predator control. He received complaints & sent them to Barnes & Howe. Gibson thought pocket gophers an especially great problem now. // I found Barnes at his house W. of Custer near racetrack. He was about to go out trapping, but took about an hour to talk to me. I think he was truthful tho not too observant. Barnes had worked in Nebraska panhandle & W. South Dakota for years. He said that all through White River drainage there had been many C.l. This included Pine Ridge Indian Res. where 40 000 A. poisoned one summer. One town 5 000 A. In WPA days (30's) much poisoning on Indian reservation. Some Indians objected to poisoning as they eat C.l. // Barnes sends reports control operations to office at Mitchell, S. Dakota. He formerly made maps of towns known. These showed small towns radiating out from large central town "like spokes on a wheel." Eastern boundary of C.l. range near Pierre, he thought. // In Wind Cave N.P., Shirttail town old & eaten down to bare ground, with few C.l., on oldest part in bottom. Buffalo Flats town started about 4 yrs. ago. // Old towns always re-invaded. Barnes does not think ever move out completely from one colony - very old burrows there, for generations. Barnes

Cynomys ludovicianus

Feb. 1, 1955 Custer, S. Dakota

said abandoned ploughed ground seems to be preferred over ~~native~~ prairie for burrows. Also line of old fence preferred (disturbed soil?). One preferred site was hardpan cactus flats. He knew of some in sandy bottom of Cheyenne River. In sand ~~from~~ mounds especially large. // Distance movement - colony started near Pringle, about 10 mi. from nearest town (in Wind Cave N.P.). Occasionally one seen out by self, perhaps in shallow temporary burrow; These always females (he thought pregnant) Barnes said. Largest towns over a section in size. ~~Town~~ Colony may start with a pair (or even one ♀ he thought). Usually start in bottoms + work higher on sides draws in time. They like buffalo grass *ridges* he said (few on ridges in Colo.). // Prairie dogs very tame at Devil's Tower (one visit) but wild at Wind Cave. Barnes said never killed on road. Rattlesnakes sometimes lie in paths in grass. *C. l.* jumps over. Snakes probably eat *C. l.* ~~Usually snakes~~ Many snakes sometimes seen in *C. l.* burrow, hibernating (snakes go in in fall, Sept. ±). Main predator is eagle. B. never saw catch but saw where one caught, several times. B. thought coyotes little effect because many coyotes in old days when many *C. l.* He said *C. l.* sometimes turn over rocks + eat insects. He had also seen eat grasshoppers. B. said poison seldom gets all. After poisoned *do not* all gather one part town. Survivors very smart + hard to trap or poison in spite repeated poisonings. B. had also used smoke ~~bomb~~ bomb + exhaust fumes to kill *C. l.* Rarely are holes interconnected as shown by smoke. Grain fields invaded sometimes. Usually permanent burrows adjacent, shallow

Cynomys ludovicianus

Feb. 1, 1955 Custer, S. Dakota

in grain. Cut down much. Sometimes continue to inhabit burrow 100± yds. out in ploughed field where no veg. Barnes thought no relation presence to range use. He mentioned, however, that C. l. in planted wheatgrass could keep clear only the area around burrows. May dig in shale, B. said.

Feb. 2, 1955. Talked with Archie Howe, the other F. & W.L. Service trapper, who has been here since 1921. He seemed less observant than Barnes & more liable to ~~interpret~~ say what he had heard about C. l., but not talkative or exaggerative. He thought Pine Ridge area & White River country had always had many C. l. Area from Ogalala (spell?) to Cheyenne River once covered with. He said in gumbo soil area most. When asked about sand, said not in. Migration - he ~~said~~ said he ran over one about 5 miles from a known town (heard of one 25 mi. from a town). He told of one town about 50 yds. diam. that seemed to get no larger (Pine Ridge ~~area~~ area). Barnes had worked controlling rodents on that Indian Reservation last 3 summers. Poisoning was paid for by ranchers for first treatment, at a rate of about 19¢/A. Retreatment paid for by county. Along one road C. l. for 5 miles, said ~~Barnes~~ Howe. // At Wind Cave N.P., Ranger Sutter (there 1931 but 9 yrs absence) showed us (V.B. Scheffer & I) some prairie dog towns and told us what he could about them. The Shirttail Canyon town is said to be oldest at W. end. We found much grass on areas said by Sutter to be inhabited for 10 or 15 yrs. Some of this on flat ground with buffalo-grass-like (but softer) turf with few burrows in it. Most denuded part was on a red soil slope on NE side town; this apparently

Cynomys ludovicianus

S. Dakota.

February 2, 1955. Wind Cave National Park, ^ recent invasion (Suter says). I saw half a dozen badger bored out holes in short examination. 1/4 mile W. of town ~~where~~ were two old eagle nests on red limestone cliffs. I found no casts or bones below, but difficult in snow. No eagles seen. / The Bison Flats town said to be more recent, & increasing. Most of it on rolling grassland (Shirttail complex because of cliffs, stream, trees). Old part Bison Flats town to SE, near a dam, said E. Suter. / Norbeck Dam town shows great denudation & cracking of soil near road. I think this due to heavy use by bison (many droppings). About 10 a.m., in fog, & 1" snow on ground, I saw tracks of as far as 50 yards from burrows (one to another), but only 2 sets of tracks in about 200 yards of walking. (Saw a few out on Bison Flats town but none on Shirttail (remote from pavement & visitors)). Town No. 3. on Sec. 31-36 line (1½ E. of Norbeck Dam) said to have been ~~poisoned~~ poisoned. Two
Badgers digging with C.l. nest of fine grass atop ground.
conspicuous iron pipes about 18" high in line in this town. / We visited town in Sec. 22 (R. 6E, T. 5 S), which had been poisoned & area reseeded. This in red soil area showing some heavy erosion. Fence taken down 1954 - had enclosed a soil & moisture experimental plot in town. ~~Ft~~ (Picked up coyote scat in town No. 3; saw 2 coyotes walk across Norbeck Dam town). Few Crotalus in Wind Cave Pk. but many at Badlands N.M., said Suter (former Supt. at Badlands). / Prairie dog poisoning here has been carried on since 1952, August, with strychnine poisoned oats. All authorized & recommended by James Cole has not been

Cynomys ludovicianus

February 2, 1955. Wind Cave N.P., S. Dakota.

done, due lack labor. Poisoning terminated by Director order last fall. This I got from files (abstracted). Grazing has been much reduced by taking off about 1000 elk + many bison within last few years, + an E-W fence at old N. boundary has been taken down, to increase freedom movement of bison.

February ~~3~~ 4, 1955

~~Yesterday~~ In afternoon, day after snowstorm with about 10" snow, halfovercast, + moderate wind, I saw no C. l. out from 2:00 to 3 p.m. in Bison Flats + Norbeck Dam towns.

February 5, 1955.

Still moderate wind (10-15 mph.) from W. but sky nearly clear. At 11 a.m. I walked around in Norbeck Dam town + found round hole in snow surface within rim one crater burrow where a C. l. had come up; I saw one out on all fours at 11:05 (he went down into hole in snow; no mound visible above surface; allowed approach to 100 yds.). Another seen out 11:15. (temp. -7 °C., shade, 8" height). This town mainly in broad gently sloping basin, but mounds on ~~[illegible]~~ nearly flat low ridges around, + a few have spilled over to across a creek to NW. Many mounds show above snow surface. they may well break wind velocity near ground + cause snow to drop, so decrease soil blowing + increase moisture. 11:35, viewing from road, none out. At 1:30 p.m., none out on flattish windy N. portion of Bison Flats town, ~~to~~ near highway, but at least 5 in a wide draw farther S. S. slope especially, tho only 5 to 10 %, as if sunshine stimulated emergence. at 3 p.m. with mod. SW wind, 12 seen out on S-facing slope of this draw, + 4 on opposite

Cynomys ludovicianus

February 5, 1955 Wind Cave N.P., S. Dakota

slope (also in sun). Bare ground rather prominent on S-facing slope. C.ls. dig a lot, then sit up & eat, holding food. Some food seemed to be base of grasses, dry at tips. I shot one ot that was near sno burrow in snow. There were 4 scratched out holes, about 2" deep, in reddish soil with 1/8" icy snow cover. Apparently roots uncovered & eaten. 3:15, only 1 out on N. slope (10%), 7 on S. slope (5-10%). One fed & gave territorial yelps (straighten up neck & body) within 50 yds. of my parked car. It was erect, feeding, when gave yelp, & did not drop down from erect pose afterward. // I spent 3/4 hour walking around in Shirttail Canyon town & saw not one C.l. Somewhat protected ~~from~~ from wind there & some S. slopes, but none seen, nor any tracks. Many burrows here near (30 yds. from) pine trees. // Bison Flats — 3:20, shadows long on N. slope & wind about 20 mph. None out on N. slope & only 5 on S. slope. Dogs wary; I could not drive to closer than about 75 yds. I drove down draw (E.) about 300 yds. to ~~at~~ an earth dam about 4' high & 200' long. Here was said to be oldest part of town. Mounds especially large & widely spaced, it appeared. Some about 1½' high & 5 yds. across. All mound-like, not distinct craters. Large mounds may mean old (or loose soil?). No C.l. out by 4 p.m. Their day apparently about 5 hrs. long today, & doubtless many not out at all. // As to former grazing by buffalo on park, Lemmgen said that once there were 550 when park less than half present size. NW part was formerly part of Norbeck Wildlife Refuge. Now aim at 350 bison but have permission to cut this to about 100 if necessary to maintain range. // Scheffer (V.B.) heard C.l. on Sec. 22 town near CPER on Aug. 24, 1954. 40 rat traps, variously baited, took none by next p.m.

Cynomys ludovicianus

February 9 Ft. Collins, Larimer Co., Colo.

Interviewed Dave Crouch of Brush, Morgan Co., who has been F & WL rodent & predator control man in N. Weld Co. since 1948 1948. He marked a map for me showing location many poisoned towns & a few not treated. He was quiet, intelligent, & well informed. He also had worked in Park Co. (about 1945), Morgan Co. 1947, Logan Co., & others. Once in Morgan Co. he poisoned a town that had at least 4 all *white* prairie dogs. As to dogs gathering in one area poisoned town, he thought they would not until following reprod. season. Poisoning usually not done until mid-June or later to give chance all young to come out. First emerge about mid-May usually & spread of 5 or 6 weeks in time births (coyotes too) in Weld Co. He said av. litter size 5 usually assumed tho this probably maximal. He had recognized *no* tendency to ~~inhabit~~ invade formerly ploughed ground. They seemed to start in heavily sodded low areas & spread up slopes. Three awn grass apparently disliked and not cut by *C. l.* tho they cut down sagebrush. Much difference in density burrows. On 3000 A. of Warren Live Stock Co., averaged about 20 A/lb. of 1080 oats (normal 3-4 A?) because low density. The big town on Henry Prange place (Sec. 33) poisoned 3 years ago, then last year had many dogs & again poisoned; probably some left still there. Jim Lawrence town near house poisoned 1953 & no complaint last year (prob. good kill). % kill constantly less, Crouch said. One town baited late June but later visited & found little effect (young out later?). *Late* breeding 1954 apparently.

Cynomys _ludovicianus_

February 9, 1955. Ft. Collins, Colo.

As to sand, he said they burrow in very sandy soil only when well sodded. Sandiest known to him about 5 miles N. of Masters. Largest mounds there on Tony Romani's place (in Antelope Refuge, N. Larimer Co.). He Crouch had dug out no burrows. Water - _C. l._ tend to be near, perhaps because green feed, not water. Small rodent associates - only _Citellus_ _tridec._ important; probably white-footed mice & some kangaroo rats (_Citellus_ _spilosoma_ rare). Ferrets - none seen this region (but saw, & tracks, Park Co., about 1947, where many & other species (_C. gunnisoni_ ?). Coyotes, badgers, jackrabbits increasing here, Crouch said. (Ave. litter size coyotes higher than during last 3 years). Crouch thought prairie dogs now under _control_ but would not be eliminated entirely. Poisoning done only where complaint made. Farmer pays cost bait (varies; about 12¢/A. in Weld Co. & must pay for follow up work; others pay by A. including follow-ups; much variation between counties. See Co. agents for info.). Logan county still has many prairie dogs though now being poisoned (F & WL man). Crouch had no idea about what age or sex class migrated but thought new colonies started up to 3 or 4 mi. from old. He said that small colonies continually starting now in new areas (on LU project lands too). / Crouch agreed to hold off poisoning on towns I was studying, if no complaint by ranchers.

February 11 Nr. Ft. Collins, Colo.

Fresh snow on ground yesterday morning but cold & partly overcast yesterday. Clear & fairly warm today (about 38°F.). At 11 a.m. I observed the Spring Canyon colony and saw many out. In the E. group

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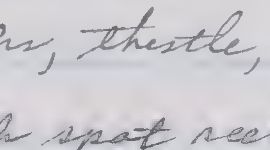
February 11, 1955 Nr. Ft. Collins, Colo.

there were 4 on one mound close to fence & another 5' distant. Near one of formerly active burrows of W. group, 3 on 1 mound. Two on one mound in SW groups. Some yelping seen & heard. Once I counted 16 total out at once. 7 in E. gp., 2 in SW., & 11 in N. center & W. gps. (see back p. 33). I tried to walk close enough to shoot one but they allowed approach to only 150 yds. I examined tracks in 3" deep snow. Apparently few or none made yesterday. At one large fine shale mound where I saw one for long when attempted trapping, no tracks at all. Food - within 50 yd. diameter area were 4 spots where Opuntia leaf had been eaten & fragments & spines left on ground. Green tissue exposed & pieces leaf 2-3 sq. inches detached. Photoed one of these. Another Opuntia leaf eaten tho yellow & dried. // At crater in W. group where I saw 3 at once, tracks did not go to any other burrows. Longest series tracks went 40 yds. from 1 burrow to another. Longest foraging trip from burrow about 15 yards. Salsola scraps at some tracked spots where apparent feeding on branches (dry). Cirsium at some too but not eaten. Near pond bed where many cockleburs, some, opened, on snow surface. Much Salsola too in pond bed. // Burrows (no.) connected by tracks in groups of: 4 - 6 - 1 - 1 - 3 - 3 (in area where saw 5 or 6 out) - 2. No tracks in SE group. // Definitely 2 or more in some burrows. At one burrow track of one went out only about 4', then returned to hole. Tracks in gen'l showed visits to exposed ends rocks, thistle, cow-dung (tho no sign eating), as if went to dark spot seeking food. // Tracks - one kind in groups 

. Many tracks showed clear scratches of 3 toes as feet brought forward . all widespread. Photographed some tracks in snow. I obsvd

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February 11, 1955 Nr. Ft. Collins, Colo.

photoed & set traps (4 steel) in colony until 2 p.m. None out by then. Ground under snow hard & frozen, but soft and wet on the mounds. Traps buried on sides mounds. I found clear tracks of a mouse (probably *Peromyscus maniculatus*) that went down into two *C. l.* burrows. These burrows not opened in snow by *C. l.*; mouse hole down thru snow into burrow mouth. Rabbit tracks went to some active burrows. Several sets tracks of *canids* near mounds but no signs digging. One prairie dog track showed digging thru 6" snow at mouth. burrow (in or out?). 3" snow on ground covered this mound, out of sight, but many stuck well above snow. High mound advantage as stays clear of snow generally.

February 12, 1955. Overcast & cold but calm. At 11:30 a.m. visited Spring Canyon Dam colony. *One* only seen out. Temp. -5½ °C. then & no sunshine. None in traps or evidence they had been out (detect disturbance & stay in? traps buried). Some sunshine & warmer in afternoon but none in these 4 traps by 5 p.m. / At 3 p.m. I visited colony at Guy Jordan's. Saw at least 2 out. Many tracks in snow tho snow covered only about 1/5 of ground. I set 5 steel traps at separate burrows showing activity. At edge some mounds excrement concentrated in one area, tho not forming a pile. Found several pieces of chewed & broken off prickly pear leaves where *C. l.* had fed on them. // Crouch said eat young wheat plants but not full grown. Whether burrow in ploughed field depends on amt. irrigation.

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February 13, 1955 N. Ft. Collins & Loveland, Colo.

At 9:30 a.m. arrived at Spring Canyon Dam colony. Sunny, calm, & warm for this season. I saw 3 out at 1 burrow (where no trap) & 1 other out. I set two live traps near burrow where 3 seen, & departed. These 3 down when approached to 150 yds. Drove to Guy Jordan place where at 11 a.m. I saw 5 out of burrows. None in my 5 steel traps though. I set 4 live traps & walked off. Across a 200 yd. wide ploughed field to S. I saw 2 out & found there 5 burrows at edge gently sloping field. Apparently much room to expand to S. These 100 yds. from edge ploughed field. Cover here coarse low creeping grass that grows on wet sites this area (= *Distichlis stricta*?), 6"± bare space between plants. Tall coarse grasses closely cropped & *Atriplex* too, so heavy utilization (by horses & cattle, acc. droppings). Mounds of non-rocky subsoil - apparently claylike as in small balls (took kodachrome 35mm. pic). These *C. l.* down when approached to 200 yds. All very wary. I stayed in area until 12:30 but none out by then (some an hour undisturbed). Took up traps & returned to Spring Canyon bunch. There at 1:30 p.m. I saw 11 out, but none near my steel or live traps. // The Loveland colony in area of *Atriplex* (4-winged) about 3' high. Several badger dug holes this area. Apparent *C. l.* burrow centered atop a tough grass hump about 8" high & 1½' across (why?). Another at base of fencepost, loosening post. All in a group to S. of a dry drainage ditch (artificial dug) & upslope 200 yds. from another with water (ice now). // On good day at Spring C. Dam, 20-25% population out 9:30 a.m. Those feeding walk *slowly*, raising heads for a look every

50 + 100

5000

45000

43560

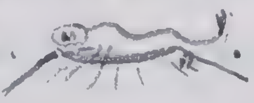
1111

Kofford

Cynomys ludovicianus

February 13, 1955 Nr. Ft. Collins, Colo.

10 ± sec. // At 3:45 p.m. at Spring C. Dam colony only one still out, tho still clear, calm, & sunny. None near traps, nor sign of tracks or eating grain bait. Three seen earlier today about 150 yds. S. of fence where not before ~~seen~~ noted (or tracks) since December. Many tracks near burrow I marked with stones where saw one on first visit here with Baldwin. Probably more out than any previous day in last month. Probably at least 20 present in 200 × 300 yard area (= 12 A ±). I set 4 more steel traps, buried, on mounds where saw C. l. / A Bates loggerhead feeding on ground 50 yds. from burrows, but food not found.

February 14, 1955. Visited Spring Canyon Dam colony 11 a.m. & saw about 5 out but none near traps. Where live trap set none out, but 4 at a burrow 30 yards distant (probably same group). At noon about 10 out, walking slowly, tails usually up, feeding. None came out of holes where steel traps buried, nor any tracks there! I reset 1 trap & put out 2 more so now 10 set at 9 holes. Nearest approach allowed by C. l. was about 175 yds. They ran to burrow, then gradually sink in farther as man approaches. Sometimes remained crouched at mouth burrow, tail up, & freeze for sev'l min. 

Feb. 15, 1955 Nr. The Forks, Larimer Co., Colo.

Drove to Pat Feree colony NW of The Forks. Arrived 9:15 a.m. & saw several C. l. out. Half overcast & 20 mph W. wind. I tried to shoot some. Missed many, apparently because of the wind. Three, bloody, escaped down burrows. These seemed to slant down, for about 2 ft., then drop vertically;

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about a ↓. Snowy lining for first 2 feet on some. Finally got 3 (by 12:30 p.m.). #3 stayed out, went to another burrow, & fed after 2 others went down hole when group alarmed. This one an imm. ♀. #2 taken as follows. I saw 1 on mound & stopped 100 yds. distant. It froze for 5 min., then started flicking tail forward, & soon started to forage. A second ran up to it. They nosed, then one smelled rear other. ~~Soon~~ one (same?) smelled rear other. I shot the one farthest from burrow; imm. ♀. #1 was apparently unaccompanied & shot at 150 yds. An older ♀. Probably about 25 ind's seen in all. One gave alarm (?) call at rate 3/sec. Probably only saw fraction of total out. By 12 M. 9/10 cu-str. clouds & 30 mph. wind. Increasingly cloudy. Departed 2 p.m.; a few still out then. // At Spring Canyon Dam colony found 1 steel trap sprung & one with ad. ♂ caught by forefoot (trap set yesterday). This ♂ 8. It had not tried to gnaw leg but was facing down burrow, pulling. Very muddy & apparently cold & tired. Took all 4 to Colo. A&M, Zool. Dept. // No sure evidence new burrows or expansion colonies yet. Little ~~or~~ or no evidence recent repair of burrows.

Feb. 16, 1955. Nr. Ft. Collins, Colo.

Clear day, warm (55°F.?), & mod. breeze. At 1 p.m. visited Spring Canyon Dam colony. Only about ¼ ground snow covered. Saw 9 out at once. Two (♂ 9, ♂ 10) adult males taken at burrows 5 yds. apart in W. group. (One killed for examination; ♂ 10 kept alive). One of these in trap outside burrow. It lay flat on belly & froze as I approached. Then it growled & snarled loudly & lunged at me with open mouth again & again. The other, a short distance down burrow, made no sound,

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and did not try to bite. In burrow coming up hard - probably ±5 lbs. or more resistance. These two taken in steel traps set Feb. 11 but apparently no activity at these burrows until today; another trap sprung, another stepped on but not sprung, another with tracks alongside - so much activity today (best weather yet this year) & steel traps (No. 1) adequate for capture. No chewing off of feet. Those caught taken by ankle or foot (1 front; 2 hind).

February 17, 1955 Denver, Colo.

Visited Denver Lab of F & WL Service. Met there Weldon Robinson, D. Spencer, J. Neff, C. Sperry, Mr. Welch, Mr. Ward, & others. Robinson especially interested in C. l. ecology because of Thomomys problems. I had little chance to talk to Spencer. He is said to have trapped many C. l. in past. Sperry offered many suggestions on food (stomach analysis) work & offered to help me on this if I brought prepared material there. Use of darkroom & other facilities offered.

February 21, 1955. Nr. Ft. Collins, Colo.

Snowstorm Feb. 18. Overcast & some snow Feb. 19. About 6" snow at Ft. Collins. Windy & cold but nearly clear Feb. 20. Today I visited Spring Canyon Dam colony at ~~abt~~ 9:30 a.m. Holes at most burrows having traps were plugged with snow. Ground about 7/10 snow covered, wind having blown off much. One burrow showed a C. l. had come up but not walked on

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February 21 Nr. Ft. Collins, Colo.

mound. Two of E. group had come out & walked a yard or two on crusted snow, breaking thru & sinking in an inch. Most traps buried. One set uncovered in burrow had been walked over without springing, apparently. 11 ♂ $\overset{10}{9}$, kept in cage, healthy but eats little. Kept in house or on back porch. No tendency to hibernate. Climbed out of 16" deep box quickly by jumping up at corner & getting forelegs over. When wire put over it jumped up & butted with head forcefully. Makes no sounds. Still easily frightened. Has weasel-like odor on occasions. // Cold S. wind. Revisited Spring Dam colony 3 p.m. More activity had occurred during day tho in 20°F. Two burrows plugged with snow had 3" deep 3" wide hole dug in snow at outside of plug. Tracks up to 100' between burrows. One which had small hole poked up thru snow plug at 9:30 a.m. now completely opened & tracks outside. Three ~~Two~~ that had many tracks on last warm day showed no activity. About 3/4 of those seen to be used on warm day were opened.

February 22, 1955 Partly overcast though near freezing all day. At about 1 p.m. I saw 5 out at Spring Canyon Dam colony. One taken in steel traps (♂ 11). This same burrow as ♂ 9 or 10 taken Feb. 16. Leg broken by steel trap. In cage much growling, cat-like. It butted nose into side many times, making snout bloody. Killed this one in lab & exam-

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February 22, 1955 Nr. Ft. Collins, Colo.

mid it (or 11). Set 4 more steel traps & reset some of other 10 (1 spring.). Crater where 2 traps set (#1&2, p. 57) showed no activity (first traps set here) since storm. Another pair burrows that were plugged with snow yesterday were open today. Two plugged with snow had digging about 8" deep in outside plug, but not through plug. Dog tracks near some burrows & dog defecated in one.

February 23, 1955. About 2" snow fell, starting last night, but a little sunshine this morning and temps. ē 30°F. I visited Spring C. Dam colony at 1:30 p.m. & found by tracks that only one had been active (#6, p. 57). It had walked to several spots that protruded thru snow (cow dung, rocks, *Salsola*) & had scattered particles of *Salsola* & exposed more (also *Xanthium* burs) beneath. Had gone up to 11 yds. in line from burrow & had made about 4 trips out & back. After previous storms this same burrow active & also no connecting tracks with others. Present concentration prairie dogs much greater N. of fenceline (near dam pond but perhaps better grazing) than S. Population estimate 15 N. of fence within 100 yds. distance & 7 S. of fence within 200 yds. Apparently dead part of colony extends on to S. 1/4 mile.

February 24, 1955. Clear, calm. 6°F. at 8 a.m. Visited Spring Dam Colony. About 2" dry snow on ground. At 8:45 a.m. none yet out tho sun bright & no wind. 9:07, first seen out. Sitting by burrow. Same one where only tracks yesterday. 9:10, walks, tail up & vibrating at irregular intervals. It puts nose to snow here & there. Looks up often as if for danger. Picks

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up a morsel, sits up on haunches, & eats, holding food with both forepaws. Walks about 3 steps / sec. with forefeet, or slower. Then finds another tidbit. Wanders about, within 5 yds. burrow, foraging. Still at it 9:20 when light breeze comes up. Another out 9:20, this one in ~~#~~ E group at N. edge. It keeps forefeet on a dark object & puts nose down, as if to feed for about 1 second at at time. Looks up every 1-1½ sec. Very alert. No others out by 9:25. Temperature air 2' above ground in open shade = −8° C. (= 17½ °F.). Breeze est. 5 m.p.h. from SE. 9:35, a third #3 out, 100 yds. S. of fence. Then another =4 with the second, & at 9:38 a third (=5) out of burrow where the two are out in E. gp. N. of fence. One of these gave 2 "jump ups". They go up onto hind feet & throw ~~head~~ muzzle up vertically, then quickly drop down. Three feed peaceably around one mound. #3 apparently went back in as not seen again by 9:45. Still only the 4 out 9:50. The group of 3 about ~~same~~ same size & could be juvs. Occas. one runs with loping gait, belly in upward curve throughout, not straightening trunk in jumps. The 4 out feed near edge dry pond where there is Salsola & Xanthium but no ~~but very dry~~ apparent greenery now. 10:00 a.m., still only 4 out. Little or no breeze. −8½°C. 10:15, #1 (first out) went ~~not out~~ in. It (presumably same) comes out 5 min. later. No activity in rest of colony. // One crater having two traps had tracks Feb. 16, prob. used 17, but evidently not since (hibernate 1 week or + ?). 10:37, #1 has foraged about 30 yds. E. of burrow toward the trio, now 40 yds. from him; then #1 worked back toward its burrow. 10:50, −4°C.; One of the two went in, & #1 went in about 10:55. Compared to chipmunks or

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February 24 Nr. Ft. Collins, Colo.

C. *beecheyi* the *C.l.* very slow & gradual in movements. #1 out before 11:04 (other 2 still out). ~~10:10~~ 11:10, only one member of the two still out. It fed to 5 yds. from burrow. This & #1 still foraging 11:20. // Magpies in trees 1/4 mile from *C.l.* Occasionally one flies over colony. These also at Wellington colony). 11:25, a second burrow in neighborhood was used. Two seen in its mouth, one possibly having emerged there. #1 gathered stalks, one about 6" long, in mouth and took them to burrow and down it at 11:30. So some *gathering* in winter. Only one other left outside (in E. grp. = ~~eastern~~ earlier). Apparently "decision" to come out & feed made before 10 a.m. (Captive ♂10 most active at about 7 a.m. tho kept in unheated room & it is cold then. It took a carrot readily this morning). #1 came out about 8 min. after going down hole with stalks (= nesting material probably). #1 foraged. At a few spots it tugged with teeth at something on or in ground (root?). It picked up branch of apparent *Salsola* but quickly discarded it. 11:50, the eastern one on central mound for 5± min. #1 carried 6" long stalk crosswise in mouth. Walked 100' to burrow. Occas. stopped & seemed to gather others. Entered hole 11:55 & was out 2 min. later. Apparently ate at or next to cow dung. In feeding in snow head sometimes down 3-5 sec. 12:07, #1 manipulated 10" long stalk in mouth. Appar. more nesting material. Calm air; temp 0°C.; clear. } I then photoed burrow of #1. Tracks in nearly all directions and to within 40 yds. of other active burrow. The latter with tracks only to distance of 15 yds., 2 sets to second burrow there (one *C.l.* from underground?). Fragments of *Xanthium* burs fresh on snow. Pithy stem of tall *Verbascum* chewed up &

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probably contributed to nest material. Snow melting fast so tops most burrows now bare soil. Place where third seen to come up this morning; it did not walk on snow. No tracks at any other burrows save the 3 where activity seen (one missed yesterday, or came out later; tracks in loops to 10' from hole). I checked traps + brushed snow off them.

February 25. 1/10 overcast, calm, warm in sun. At 9:35 at Spring C. Dam colony two out - in E. group 10 yds. ~~N.~~ S. of fence where none seen yesterday. 9:57, a third out; in far W. group, 10 yds. ~~N~~ S. of fence, where ~~none~~ no activity found yesterday. Temp. -1½°C., shade, 2' high, 10 a.m. 10:02, a second out in ~~E.~~ W. group + a third in E. group, so 5 out. 10:10, one of W. gp. went in; ~~a third one~~. One of E. gp. went in but soon out again (4 total out, both gps.). The 3 in E. gp. are 60 yds. S. of where 3 yesterday (same?). More bare spots in snow than yesterday. Tops most mounds free of snow + small bare patches, but about 90% ground covered with 1" wet snow. 10:25, only one out in each group (2 total). Much warmer than yesterday at same time yet little activity (1 new trap set mound where 3 yesterday). +3°C.; light breeze. 10:40, 2 were out in W. group. One scratched ground sev'l xx with fore and hindfeet, then went in burrow + out 2 min. later. Feeding desultory + within about 5 yds. burrows. One puts nose again + again to dark object, probably cow dung. 11:00, a new one out in center of colony 100 yds. S. of fence (trap put there just before last storm), where one ~~came to~~ yesterday looked out but did not ~~come~~ walk outside. The one in E. gp. about 30 yds. upslope to E. of where initial activity. 4 total out (11:05). +3½°C., calm, warm in sunshine. 11:20, the same 4

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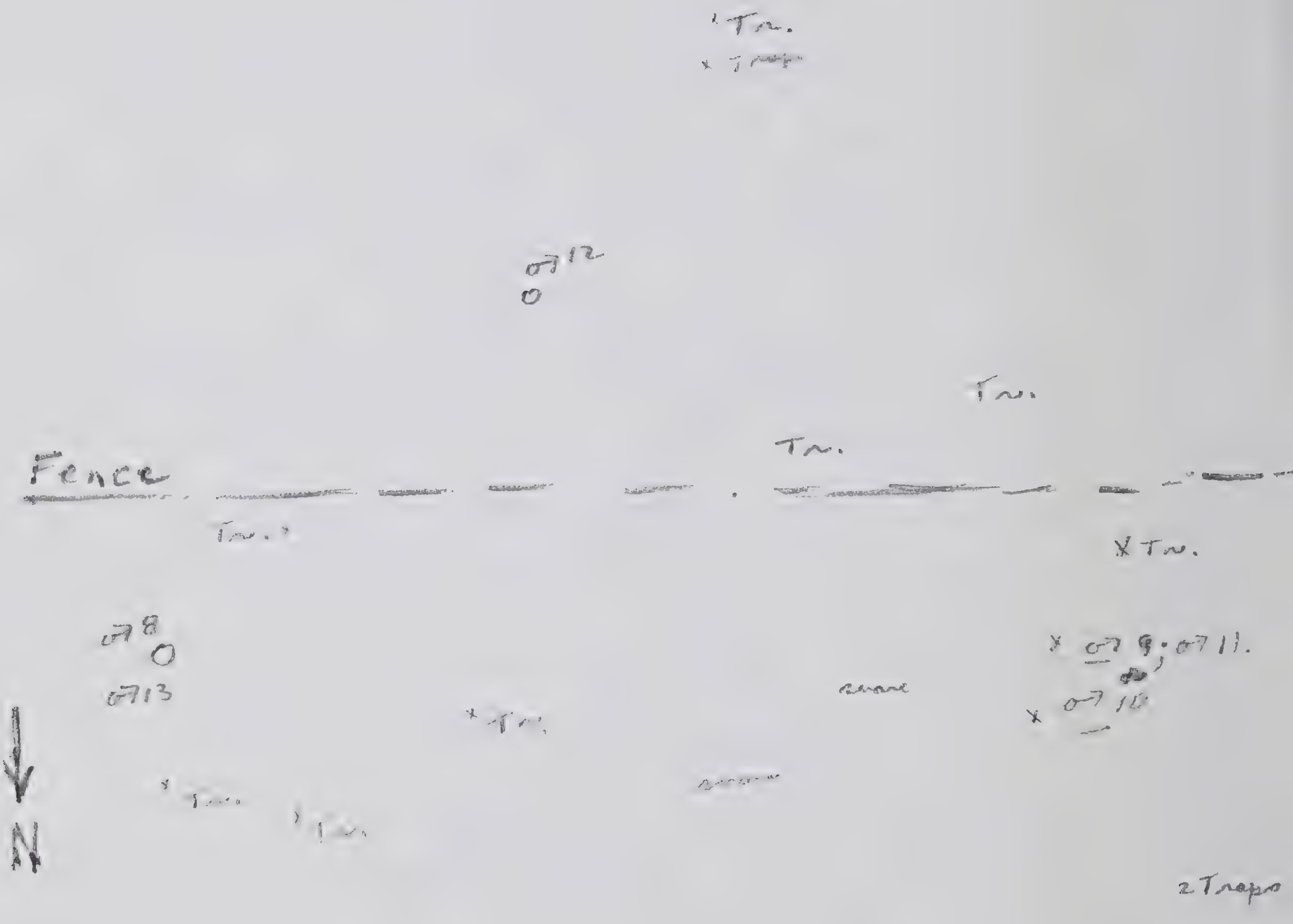
out, last out having gone not ~~out~~ over 3' from burrow. It then got caught in my steel trap there. I went & got it (♂ 12). At first it tried to get down burrow, but when I close it struggled to get away. It bit at trap held near it. Growled & snarled. // At site where 3 out in E. group, 3 or 4 burrows had tracks to them. Farthest distance tracks from a burrow was 15 yds. Some Xanthium burrs opened there, & many tracks to ~~a clump of~~ 3" high stub of grazed down Chrysothamnus (photoed) bush. Several 1 to 1½" long green-barked stems 1/8" diam. of C. cut off freshly. No greenery in grass there. Probably some eating at stubs of Buchloe. No tracks from this group to other burrows in area (on N. of fence). I checked sites other traps; no activity. // At place where 2 out in W. group (actually 50 yds. S. fence), tracks to 10 yds. from burrows. Much fresh eating at 2 leaves of Opuntia (about 1 sq. inch eaten from each; this place I photographed). At site where one scratched, scratching was toward burrow as if to build up mound but it had little effect in doing so. Again stubs & stolons Buchloe where some eating activity. Ground becoming muddy with melting snow. Departed 12:10 p.m. // Tracks of one running to burrow appeared: °. : °. :. Distance forefoot to forefoot, 36"; fore f. to hind, 25". In extra long jumps, 30" space from front one set tracks to next track . :|—'—|. :. // When ♂ 11 put into chicken wire funnel & somewhat squeezed, it started series of alarm chirps - very loud indoors.


Tr.
Traps
♂12
Tr.
Tr.
Fence
Tr.
Tr.
♂8
♂13
♂9; ♂11.
♂10
Tr.
Tr.
Tr.
N
2 Traps

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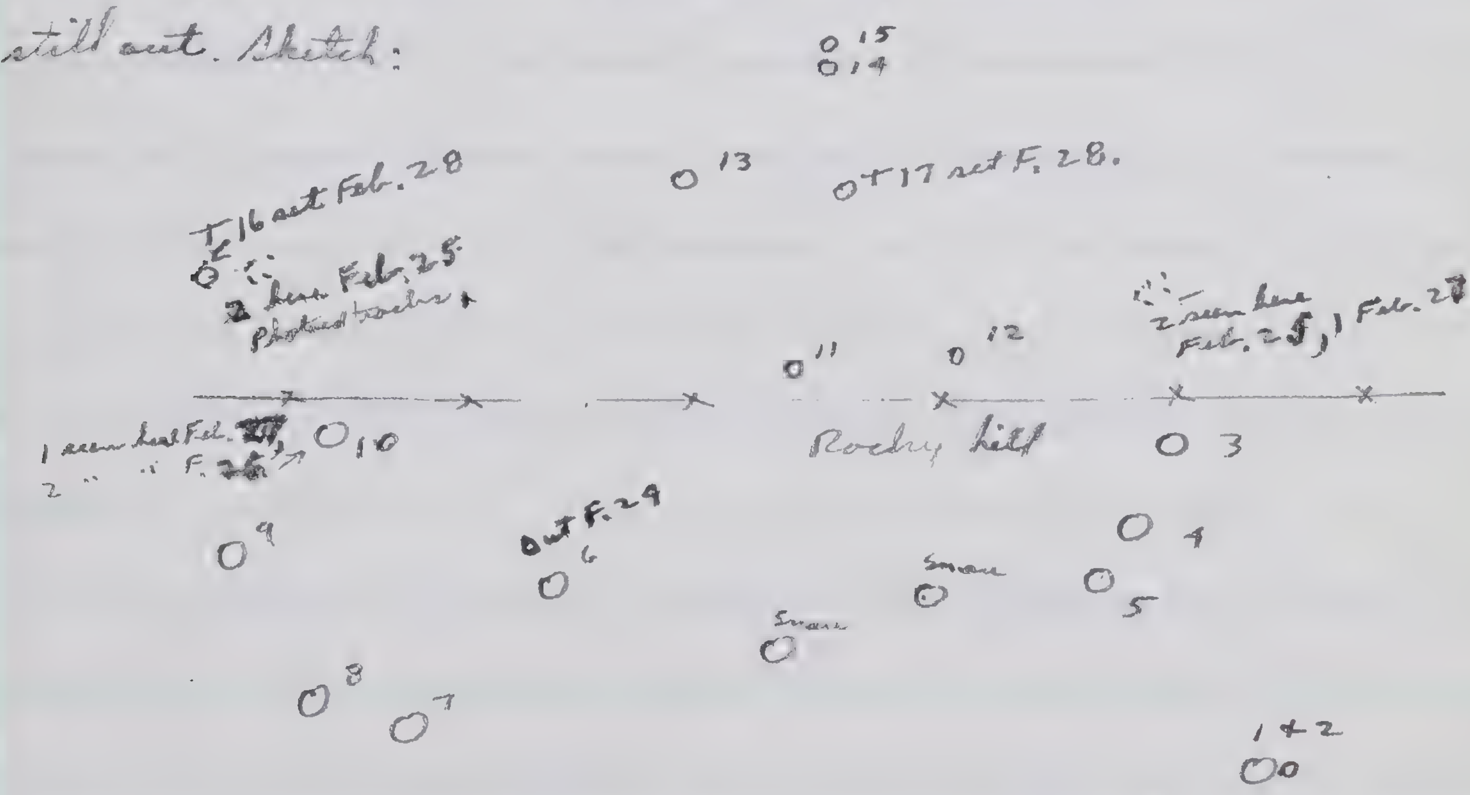
February 26, 1955. Nr. Ft. Collins, Colo.

~~Visited~~ Watched Spring Canyon Dam colony 12-12:30. Overcast & occasionally snowflakes fall, -1°C., light by Weston meter 200-300 where much snow; calm air. Two seen out in E. group burrows for 10 min. but did not stay out & not come to feed. Probably little activity outside burrows today - cold & overcast (stratus).

February 27. Visited same colony 1-2 p.m. Took ♂13 in same traps as took ♂8 Feb. 15. Saw two out. One of these at W. side colony 50 yds. S. fence (where saw two Feb. 25), other where 1 seen yesterday (trap there but has not taken any. No evidence activity at burrows where 1 & 3 seen Feb. 24 or at any ~~other~~ trapped burrows (except two, & possibly 1 more). 15 traps still out. Sketch:


15
14
13
+17 set F. 28.
T16 set Feb. 28
2 here Feb. 25
Photoed tracks +
2 seen here Feb. 25, 1 Feb. 27
11
12
1 seen here Feb. 27,
2 " " F. 26
10
Rocky hill
3
9
out F. 24
6
snow
snow
4
5
8
7
1 + 2

♂8 + 13 taken trap 9. ♂ 9 or 10, + 11, at trap 4. ♂10 or 9 at 5. ♂12 at trap 13. Three seen Feb. 24 at ~~8~~ 9, & 1 at ~~7~~ 6 (no activity since). Traps ~~4~~ 12-15 set Feb. 22; trap 7 set Feb. 24 p.m. & no activity that burrow since.

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February 28, 1955 Nr. Ft. Collins, Colo.

Overcast morning, ~~clearing~~ clearing noon. Perhaps 50°F. in p.m. + mod. breeze. I was at Spring Canyon Dam colony 2-3:30. Took 4 C.l. in steel traps as follows: ♂ 14 in T6, ♀ 15 in T4, ♀ 16 in T1, ♀ 17 in T15. The one in T4 had broken trap wire + was in hole at T6. I heard its bird-like chirping from burrow + so got it out. In traps, they protrude the 3 anal glands about 3 mm. Both ♂♂ + ♀♀ do this but strong musky smell only from ♂♂. // Before going to traps I saw 9 out at once. Snow now on 5% of ground + standing water from melting snow in spots. No apparent activity at other trapped burrows except T10. [illegible], nos. 7, 8, 11, 12, 13. Took up trap #1 + reset 10 yds. S. fence on E. side colony (=T16). Set one additional (= #17), so 16 out, not over 1/burrow. ♀ 16 taken in T1 had little in caecum (caecum + contents weighed 8 gms). Fairly sure activity that burrow (Feb. 17 (traps sprung) + 22 (tracks)). Today first females taken this colony; + 3 — suggests seldom out earlier. One taken T4 that had taken 2 males.

March 1, 1955 Larimer Co., Colo.

Visited colony on 80 acre preserve near Wellington. Saw at least 6 out. Photographed tamest one, "Charlie." Staked about 12 burrows at N. end colony where there may be no further expansion because of thick growth Kochia about 1 ft. high. This thistle has rabbit trails making openings through it. Thistle stand covers a few apparent years old burrows (how long vacant?). Temp. + 9°C. at 10:30 a.m. Sky 2/10 overcast + 25 m.p.h. wind from W. Another grass that grows thickly here tho only 4-6" tall is Distichlis stricta. Probably not invaded by C.l. but perhaps indicates wet site.

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March 1, 1955 Weld Co., Colo.

At 11:15 I arrived at Sec. 22 colony next to OPER. I saw ~~14~~ 17 C. l. out in spite of 30 m.p.h. W. wind (wind raising clouds dust over ploughed ground). One group of 9 in area estimated 100 x 100 yds. bordering cable-bed on N., 200 yds. W. of E. fence. I saw one Aquila flying 1/4 mile to E. of colony & also 10± Antilocapra there. I took 2 black & white & 2 35 mm. color photos looking N. across colony & including fence corner on E. & top of hill where eagles perch on W. Group of 3 C. l. seen to go down one burrow. Grp. of 3 seen beside another. A larger one briefly fought with smaller at edge of mound, smaller then going into burrow. The second concentration animals is to S of creek near where it crosses N. fence. Tumbleweed blown by (10') for 3 C. l. but caused no alarm. Much Opuntia up to 4" high here, & Parmelia. Shrubs, Chrysothamnus few ~~[illegible]~~ & reduced to about 6" high & wide. Occasional Yucca clumps, not browsed. Dogs not unusually wary. Three at mound one burrow allowed approach to 150 yds. Wind difficult to walk against; may be 40 m.p.h. I visited vicinity burrows. Most still show no activity. Few tracks, scratchings, or fresh droppings, so evidently much less activity here than in Spring Canyon Dam colony. Sheds of Parmelia in active burrows suggest that they may eat this poisonous plant. Much eating of dry ~~grass~~ Opuntia leaves near active burrows (must have eaten some before today), but no evidence of eating roots Opuntia. Some clumps had about 3% of leafs eaten. Pulled up ~~less Buchloe~~ grass Bouteloua (?) at one used burrow. Ground wet & water standing near foot hills melting snow.

// Returned to Spring Canyon Dam colony & took ♀ ~~18~~ 19 in Trap 3, ♀ 20 in Trap 4, & ♂ 18 in Trap 12. I saw three

Cynomys ludovicianus

March 1, 1955. Nr. Ft. Collins, Colo.

others out at 2:30 p.m. Several burrows with traps showed little or no activity (as $\overset{16}{8}$, $\overset{17}{6}$, $\overset{19}{11}$, $\overset{15}{2}$), tho muddy in entrances so tracks should show. Set one new trap (#18). Least snow on ground since a few days after Christmas at Ft. Collins. Trap 4 has now taken 2 ♂♂, 2 ♀♀.

March 2, 1955 At Spring Canyon Dam colony about 2:30 p.m. found 3 in steel traps. ♀ 21 in Trap 12, ♀ 22 in Trap 8, ♂ 23 in Trap 14. Three other traps were sprung; trap 4 had a toe tip in it. Two caught ones had gone around in circle around drag & had then drawn themselves tight to drag. One had dragged 2 lb. stick about 20 feet up gentle slope. All had 10± fleas. ~~Some~~ One yesterday had 30± fleas. Only in this recent warm spell have I seen insects in burrows – 1 fly, 1 cricket. When approached, trapped one lies very quiet, eyes open, belly close to ground, but breathing visible. Some of the area in this colony has fairly continuous carpet of very short dry grass. The area of one cynomys runway, about 5" wide, has no litter and mainly rootstocks & basal stubs of *Buchloë*, these covering only about 20% of soil surface.

March 3, 1955 Drove to colony at 6450 ft elev. at foot of Buckhorn Canyon (Sec 22) (W. of Masonville). A N-facing grass slope had old colony. Nearly all burrows now filled in but mounds many and large. Most of large mounds 9' diam. & 12" to 18" thick at center. Soil appears to be mostly gravel on surface of mounds, due to wind erosion, but one can dig into easily with fingers – a fine loam with gravel to about 1" diameter. About 3% snow cover on ground. On old mounds, some had mainly *Artemisia frig-*

Cynomys ludovicianus

March 3, 1955. Larimer Co., Colo.

ida, leafy part only a few inches high. I photod one with 4" high composite growth. Main ground cover is Bouteloua gracilis. This has seed stalks 12-18" high so probably no grazing here last year. A coarser 2' high grass, agropyron smithii, common. Grass cover at this season covers about 50% of ground surface between burrows. Photoed a group of mounds on 16% N. slope at S. edge of colony (uphill edge). Farther uphill steeper & grass soon gives way to brush. Colony about 400 yds. E & W, 300 yds N & S. N. edge near cottonwoods & willows along stream. Slope of most of colony is 10%. No sign of prairie dog activity last year or so. Some plants Bouteloua & tall grass A. smithii on mounds. Comparison of vegetation on mounds, between, & on adjac-

Aster tanacetifolius, Chenopodium, Polygonum, on same mounds.

ent areas could be made. How long ago were C. l. killed out? ||

At 8:45 a.m. clear, sunny, fairly warm (50°?). At Spr. Canyon Dam colony I saw 8 out. At 11:30 a.m. at least 3 out, & 1 (♀24) in trap #8; sky 5/10 overcast then.

March 4. Nr. Ft. Collins, Colo.

At 8:30 a.m. visited Spring Canyon Dam colony. Earliest visit in good weather. 2/10 overcast [illegible], mod. breeze, sunshine. I saw at least 11. Most activity outside of trapping area. For example, 4' about 100 yds. west of T18 & another 50 yds. W; one used burrow at longer distance. One in burrow 40 yds. W. of T2 (one at burrow of T2). Two 50 yds. SE of T7. Two 100 yds. NW of T13. In trapped area, two seen near T10, two near T11. Often one runs 100 ft. fairly straight & fast. Social contacts - one running to near another as if for recognition - common. Some forage among rocks 6-8" high. Air temp. +1°C. at 9 a.m.

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March 9, 1955. N. Larimer Co., Colo.

Drove N. thru Waverly to Antelope Refuge & looked at a colony in Sec. 23, SW¼, on Ackerman's ranch. This was on fine soil with gravel mixture. Some mounds fine gravel. 3 *Taxidea* burrowed holes seen in 10 minutes. About 40 A. of burrows from stream to foot of a hill. All on slope of a few % facing S or E or W. I saw at least 12 out tho air cold, half overcast, & 20 mph SE wind. Much digging of holes about 2" deep near burrows – apparently to get at roots. P. Baldwin shot or 25 with shotgun 11:30 a.m.. *Opuntia* dry appearing but some fresh eating of leaf edges. Pasture depleted – 8"–12" between tufts grass. ~~Much~~ Mod. *Atriplex* canescens but browsed to about 6" high. Burrows seemed very widely spaced. Some *Pogonomyrmex* mounds in same area. Took 2 photos (black & white) of area. Should return here to get spacing, vegetation, & population dope on depleted range. Rudy Ackerman told me of this colony, another in Sec. 11 to N., & one in Sec. 10 about 1½ mi. W. of Ackerman's house. I later visited that one Sec. 10. It was on S. side of road and at least 40 A. in extent. This on ~~ap~~ very slight slope. Rudy said it had started about 1½ yrs. ago (he didn't know any *C. l.* out yet!). A man at Clarence Munro's said it had started about a year ago. I saw 10+ ~~pr~~ C. l. out tho overcast & prob. < 40° F. at 3 p.m. Should revisit this as recent colony. // Drove N. from Ackerman's thru rolling grasslands to bluffs where old eagle nests (near Wyoming line) but saw no more *C. l.* Sheep sign abundant. Why are *C. l.* so restricted? – must not spread fast or would be more widespread in spite poisoning. Social factors may slow spread of species. // Visited Clarence Munro's place. Trapper Gleason absent. One man there said now no *C. l.* on Munro's place, ~~about~~

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March 5, 1955. Nr. Ft. Collins, Colo.

about 1½" snow last night, about 32°F. max. today. 8/10 alto, cirro stratus & mod. S. wind. 1:30-2 p.m., at Spring Canyon Dam colony, I could find no footprints at any of usual burrows. Perhaps stay in readily after a few days out when can feed well.

March 6, 1955 N. Larimer Co., Colo.

Drove to Tony Roman ranch about 3 mi. W. of Norfolk. He had homesteaded here 1907. Many old mounds of large size on this ranch - in one pasture just SE of house, others to N. These in fairly even spacing, about 15 yds. crest to crest. Many had Pots *Pogonomyrmex* mounds on them but Tony sure the big mounds built by *C. l.* (ants contribute probably - ck). Mounds still barer than surrounding ground but *Bouteloua* & other grasses growing on (also *Opuntia* on & near). No mounds on flattest areas where Tony thought water table higher. A rounded grassy hill about 1 mi. SW. of house had also had none, Tony said (prob. too steep - about 30%). From top of 200' high rock-stratum topped hill about 1 mile N. of Roman's house, I could see many regularly spaced old mounds to W. A live colony lay centered about ¼ mile N. of this hilltop & old (a year or two) burrows near foot of hill. Cliffs had 3 old *eagle* nests. I found 3 lower jaws of *C. l.* near nests. (Many *Lepus* remains too). These were old. Rodents had apparently taken many sticks & bones from nests. Another old eagle nest ¼ mile to S. Saw 2 eagles flying high. Probably part of eagle studies reported by Lee Arnold was made here. In spite of favorable conditions for 1 pair of eagles to nest, *C. l.* had been very successful in past. Burrows a year or 2 dead within 300 yds. of eagle nests. In one area of also old

Cynomys ludovicianus

March 6, 1955 N. Larimer Co., Colo.

Burrows also 7 in succession had been bored out by Taxidea. I saw 3 similar within a few minutes in another part of town. The present ~~[illegible]~~ prairie dogs in NW part of burrow area but rather sparsely distributed. I shot 2 ♂♂, one of which was at burrow mouth with another dog. No coyote droppings seen. Rancher had only sheep now (cattle too until a year ago) & disliked coyotes & eagles both. He thought the active groups I saw had been poisoned by Warren Livestock Co. which had some sheep here. // Soil has red gravel intermixed & gravel covers ~~[illegible]~~ nearly 30% of surface some areas, but can be dug with hand. Crater cones of packed soil with little roots (but some grass) adobe-like & have stood up like chimneys after outer parts mound weathered away. // The ants Pogonomyrmex seem to build up low mounds about 20 ft. across & 1 ft. thick over long period, & these capped with bare saucer-shaped depression with a cone of fine gravel in center. Many old mounds had ant mounds on them, but apparently old C. l. mounds ideal for ants to make nest atop. // Grass cover with spaces a few to several inches between tufts. Mostly Bouteloua gracilis but also Buchloë, Aristida, a another short soft grass (= muhl. torr.?). Part of active colony & recently dead colony in area Atriplex canescens. This browsed but 2-3' high still. Some burrows at base Atriplex. Most activity now outside this area, W. of creek bed. // Visited reported group site. Sec. 12 & 13, T10N, R69W (1 mi. 3 SE of Tudy Ackermann's). Many large ant mounds this area but saw 3 burrows 50-100 yds. S. road & 2 to N. (in this all? from where?). Most of these on the low wide ant mounds. Droppings appeared recent, the dry.

Cynomys ludovicianus

March 7, 1955 Nr. Ft. Collins, Colo.

at 7:50 a.m. at Spring Canyon Dam colony. Clear, calm, about 32°F. & warming. Saw 3 out - but 10 by 8 a.m., 18 out at 10:20. all forage soon after emerging. Many of these around periphery of trapped area, but 2 came out of burrow at T2, 3 foraged near T12, 3 near T16. Farthest one out of burrow about 200 yds NNE of T13; two 50 yds. E of T 13. // Warm & clear all day. I returned at 1:30 p.m. & saw 12 foraging. Spent rest of afternoon mapping colony. Sec. 4 of this colony is property of George Ross. Ross has lived in this area 65 years. He has house about 2 miles NE of colony. He said that formerly C. l. near his house in present pasture. In Sec. 4 cattle & horses grazed. Six years ago poisoned by 1080 crew, Then a single C. l. seen a year or two later, then increased. He has done a little poisoning with strychnine grain since, but no complete coverage. About 1½ miles to S. is colony on property of Mr. Graese (of Loveland). Still many C. l there near wheat-fields. Ross says C. l. cuts down wheat for space of about 10 yards & digs burrows in field. // Richard Hanson gave me ♀ (no. 28) that he shot 1 mile W. of Rudy Ackermans's on Mar. 6.

Note: Slopes measured with clinometer before this were in °; from here in %.

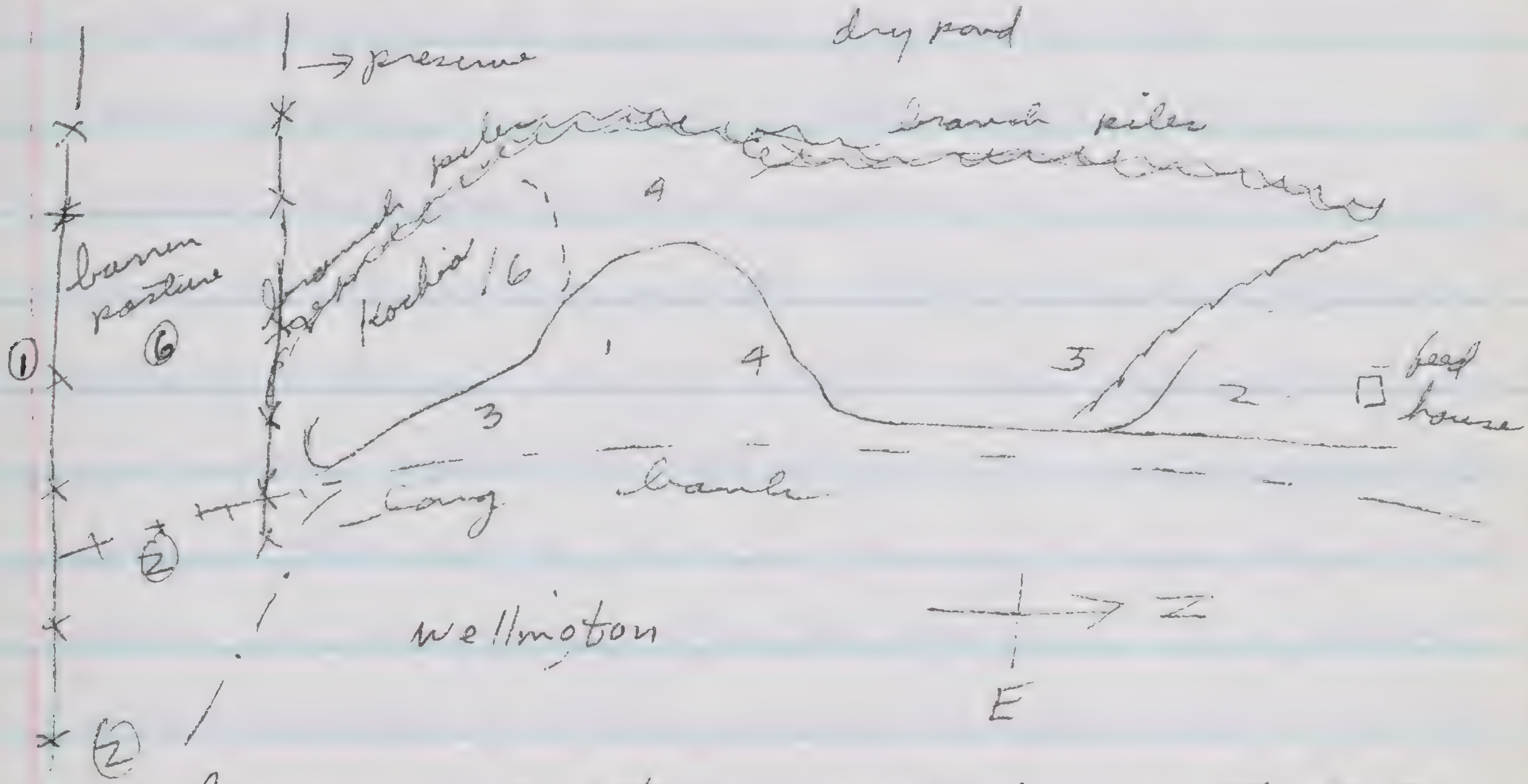
March 8, 1955 NW. Weld Co., Colo.

Drove to Wellington colony, arriving 8:45 a.m. Light breeze; 8/10 cirro stratus; warm. The farthest N. active burrow is about 100 yds. S. of feed house. Well-devel. mound with fairly tame C. l there (staked). Near feed house a fairly thick stand of Kochia. I walked to near S. end colony & counted 35 within boundaries preserve, 10 in heavily overgrazed pasture to S., & 1 just S. of fence across pasture. Because northern part colony hemmed in by thick vegetation & a dike next to

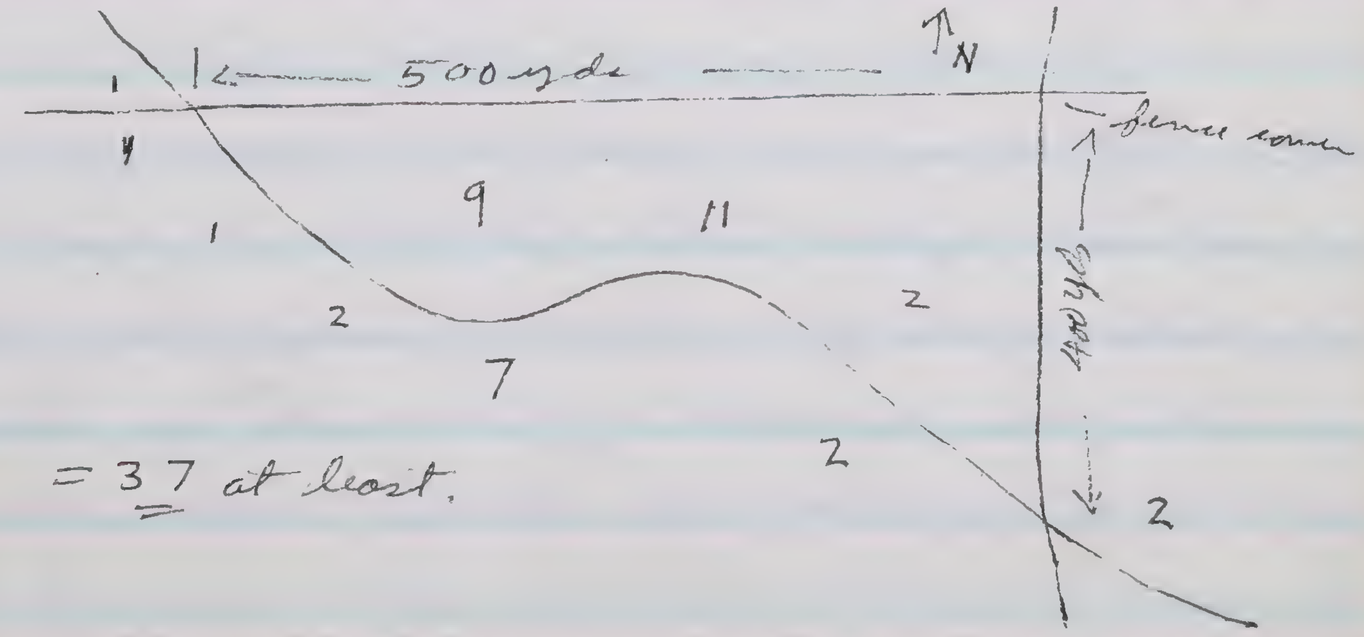
Cynomys ludovicianus

March 8, 1955   Nr. Wellington, Colo

irrigation ditch, probably there will be little or no expansion in area within preserve, but probably will be expansion to S (+ to E of S part) in near-barren pasture. If will not be molested, this end good for mapping to watch for change.


dry pond
→ preserve
gravel piles
gravel piles
4
barren pasture
Kochia
16
1
6
1
4
3
3
2
feed house
long bank
2
2
Wellington
N
E

I was surprised to see many in open stand of Kochsia. These stood up high when one gave alarm call. At least two large mounds in the Kochsia, ~~coming~~ rising to height of tops plants. Population here seems to be high. Then I drove on to Sec. 22 in CPER.   Nr. Nunn, Colo. There were many out there 10:30 a.m., when temp ± 15 °C. + breeze about 15 m.p.h.


500 yds
N
fence corner
400 yds
1
1
9
11
2
7
2
2
2

= 37 at least.

Cynomys ludovicianus

March 8, 1955 Nr. Nunn, Colorado

Saw 1 N. of fence at west end colony. Two active burrows there, 35 ~~& 70 yds~~. N. of fence about 50 yds. west of streambed. Two shallow old burrows 30 yds. N. of those. None to E. of streambed N. of fence. Opuntia shows heavy use. Half of small clumps eaten or broken off freshly. Some whole leaves (= stems) broken off at ground level. Within 15 yds. 1 burrow, 7 clumps opuntia show use & 6 show no obvious use. Throughout colony similar eating opuntia. Skin of leaves still green in spite zero temps. during winter. Some fragments in burrow mouths, & ~~parmo~~ Parmelia too (brought in?). No digging for roots in this colony (much at Spring Canyon Dam) tho shallow scratching among Opuntia clumps. // On flattest ground, floodplain of stream, many sunken areas about 2 ft. in diam. ~~with~~ & a foot deep with burrow leading off from bottom - [some C. l. later seen] no mounds; may be cottontails. One had cut Salsola at mouth as if used for nesting material. I saw one Sylvilagus crouched in mouth of a crater 20 yds. from a mound with a C. l. Rabbit went down hole; about 2 hrs. later rabbit seen at mouth same burrow. // Saw 1 grasshopper nymph. Atop eagle knoll found many old remains Lepus but no Cynomys. There I found 4 rather fresh eagle casts (saved; these new since collected in Dec.). Saw 1 eagle ½ mile distant while at colony. // ~~two~~ Two burrows 2 yds. apart apparently bored out by badger last year. I picked up large carnivore (Canis?) droppings at 3 sites near burrows (saved). // At east end colony I found three active burrows (C. l. seen or heard at two). These were 50

Cynomys ludovicianus

March 8, 1955 NW Weld Co., Calif.

& 100 yds. E. of fence. one shallow unused 50' SE of eastern most. No area of unused burrows at N & E extremities colony although some in colony are not used ~~apparently not~~ (plugged). In mounds I found 3 old skulls C. l.; tooth wear indicates old individuals. Snow now nearly all melted from this quarter section. Some had foraged on near flat grass-covered floodplain where no mounds. I set 15 live traps in SW part colony baiting with rolled oats. Left these 1:30 - at 3:30 none sprung // at 3:30 cooler but well above freezing (30 mph W. wind) & ~~at~~ cirro-stratus overcast. I saw only 2 out in Sec. 22 colony. // From 2:15-3 p.m. I visited the large colony on Grange place (R 65 W) that was poisoned last year, but I saw no activity (poisoned '54; good kill?). // Yesterday Mr. Ross told me that sometimes annual weeds came up thick when C. l. poisoned. He thought same good in all animals. On his Sec. 4 pasture people sometimes shot C. l. A few years ago one man claimed to have shot 32 in one day. Ross said oldest part of Spring Canyon Dam colony near the pond (on Goodell property).

March 9, 1955 2/10 cirrus clouds, 20 mph W. wind, & +15°C. at 10 a.m. at Sec. 22 colony. Apparently none in traps, & in next hour none came out near traps except 2 at distance 10 yds. from traps. On the rise in center N. part colony, 9 counted, 6 being in area 5 yds. diam. These 6 10 yds. uphill from base slope. Two others fed on wet ground in bottom where snow had melted. Two came out of one burrow & one ran 50 yds. & fed. A rabbit (Sylvilagus) head peeked out of one of the sinkholes on flattest bottom. At 9:50 when I arrived an imm. Aquila flew up from on or near ground in colony, circled & rose, & soared away. (much white on base tail & near wrists). This same (apparent) eagle returned

Cynomys *ludovicianus*

March 9, 1955 N.W. Weld Co., Colo.

at about 11 a.m. when I was checking traps. Traps - none ~~of~~ sprung but bait entirely gone from 5± (mice?). Very dry air & wind increasing. Left Sec. 22 colony 11:45 a.m. || 12:15 - 1:30, visited old colony 6 mile SE of ~~CF~~ CPER Hdqtrs. In Sec. 2 & 3, T 9 N, R 65 W. Crouch had poisoned there 2 years. I found no active burrows. Old burrows extended about ½ mile along one very shallow draw & ¼ mile up a ~~bajo~~ tributary. On both sides of 25 - 50 yd. wide bottom, where blue grama & *Chrysothamnus* (to 1 ft. high) thicker & land flat across valley (gentle slope down drainage). Up slopes to about 10 % slope. Soil rather sandy, rather than claylike, with little rock (reason for going no farther up slopes?). Few burrows more than 100 yds. up slopes; most within 50 yds. edge bottom. More than half old burrows apparently used by rabbits, especially *Lepus townsendi*, judging by digging (larger chunks than *C. l.* digs) and droppings. Rabbits keep old burrows open! Some eroded leaving central chimney of packed soil & loose grass. This has consistency of poor brick mortar of fine sand - not easily broken. At each burrow an area 2 to 5 ft. in diam. where stubs of old grass tufts but no growth forbs (rare exceptions). *Aristida longiseta* present but not near *C. l.* mounds ~~so much~~ especially. It is common next to old *Pogonomyrmex* mounds however (one photoed). *Lepus* ~~did~~ apparent diggings could be sometimes mistaken for *Taxidea* diggings, but a few (4) seemed fairly surely old *Taxidea* work, there in one small area. Spacing of burrows wide - 50 ~~a 100 yds.~~ yards apart sometimes; many about 30 yds. apart. Far apart = ? - new colony? sparse food? Hillslopes irregularly mottled with yellowish areas where *Bouteloua* prominent (seedstalks to 1 ft high); ~~but~~ *Buchloe* also common. Bottoms more solid yellowish in aspect.

}} Drove then to "ghost town" betw. Sec. 35 & 36, T 10 N, R 65 W., where Crouch

Cynomys ludovicianus

March 9, 1955 ‘ NW Weld Co., Colo.

had poisoned 1954. Saw 9 Antilocapra nearby, found coyote carcass + found apparent coyote droppings near + in 3 burrows. No fresh C. l. workings seen. Most mounds on bottom of 1/4 mile wide draw (no streambed) where slope 1 to 2%. Some up east side bank to 12% slope (face W). None atop the bank where land more level, 20' above level of bottom. // I paced distances between 5 to 9 burrows in approx. straight line; 4 trials: ave. 14 yds. on 1-2% slope, ~~16 yds apart~~ (also 16 yds + 19 yds. 2 other trials), + 15 yds on 5% slope. So fairly constant average ~~[illegible]~~ about 17 yds. Ave. all ~~to~~ 26 counts was 15 1/2 yds. No mounds over 8" tall. Surface soil rather loose + fine sandy; gravel in subsoil, as shown by mounds. On much of flatter ground aristida conspicuous. It makes up about 10% of plant cover at most + stands 6-8" high

Bda + Bgr =(Buchloe - Bouteloua)

while Bu - Bou only ~~to~~ 1 inch high. // Returned to Sec. 22. No catch in traps; closed + left them. I saw 3 still out 4 p.m. in 30 mph warm wind; sky 8/10 ci. + alto-cumulus.

March 10, 1955 Nr. Ft. Collins, Colo.

Visited Spring Canyon Dam colony 5 to 7 p.m. Found my cow chip coverings had blown off of some traps and 3 C. l. in traps. These may have been there 2 (♂ 31) or 3 (♂ 29, ♀ 30) days. ♂ 29 was in burrow, having pulled wooden drag to entrance. Upon being killed this one let out much apparent semen. ♀ 30 had gone around + around rock gas drag, forming a cone of earth, but no digging down. ♂ 31, at about 6:30 p.m., in dark, had burrowed under edge of mound so nearly out of sight from surface. All 3 had 20 ± fleas (count). I took up traps 3, 6, 7, + 18, + set new traps nos. 19, 20, 22 & ~~+~~ 1 21. ♂ 29 was in trap ~~3~~ 7, ♀ 30 in T 3, ♂ 31 in T ~~13~~ 17.

March 11, 1955. Took ♀ 32 in trap 10, ♂ 33 in trap 9. Set 3

Cynomys ludovicianus

March 11, 1955   Nr. Ft. Collins, Colo.

more traps in Spring Canyon Dam colony (nos. 23, 24, 25). At this colony I saw 3 out at 7:10 a.m. Ran trapline 1:30 to 2 p.m. Saw 6 out at 1 p.m. Returned 5 p.m. & checked all traps but none sprung. 20 traps out now; mostly no. 1 steel traps but 4 or 5 no. 0. No. 0 seems less ~~good~~ as pull out or catch only tips toes. No bait used.

March 12, 1955. Warm & clear. At 10 a.m. I saw 7 out at Spring Canyon Dam colony. 2 N. of fence on E. side, the others scattered in S. part colony. Visited traps & took ♂ 34 from trap 22, ♀ 35 from trap 21. These in addition to the 7 seen. Both in burrow, caught by one hind leg. Both put in small cage; some minor fighting & snarling but apparently no harm done. Burrow of trap 6 shows no further use; evidently occupied by only 1 (captured) in winter. Since warming of weather, ~~the winter~~ burrows peripheral to winter used (snow tracks) ones used - such as near 24, 25, 20, 21. ~~#~~ Burrow where one seen today is 80 yds. NNE of #8 (used winter). Still much digging to 2 or 3" deep near and on edge some mounds. Two had 1/8" diam. white root chewed at bottom of digging.

March 13, 1955.   CPER, Weld Co., Colo.

Visited Sec. 22 colony to map at 10 a.m. Several C. l. out, some within 5 yds. of shut down live traps. All snow melted & some water standing in creek bottom. No green forbs seen yet. Much evidence of eating & breaking off opuntia leaves. Some burrows at bases fenceposts of N. fence may be of C. l. I picked up 2 groups old coyote scats on colony. Saw an Aquila over colony at about 11:30 a.m. Some greening now starting in wheat fields. // At about 4 p.m. visited Spring Canyon Dam colony and found 3 ♂♂ in steel traps, // ♂ 36, ~~37, & 3~~ in trap 15, where no activ-

Cynomys ludovicianus

March 13, 1955. Nr. Ft. Collins, Colo.

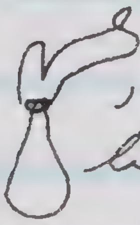
ity apparent for long; ♂ 37 in trap 25, set March 11; ♂ 38 in trap 8, but had pulled stick drag to a burrow 25 yds. to N. & was in this one. In burrow, caught by hindfoot, they give very strong resistance to being pulled out - perhaps 15-20 lbs. resistance. One forb with ~~[illegible]~~ dissected leaf now about ½" high, seen several sites. (Cogswellia = = Lomatium orientale)

March 14, 1955. Visited same colony 10-11 a.m. Saw 6 out + 2 in traps. ♀ 39 in trap 9, ♀ 40 in trap 11. ♀ 39 had imperf. vulva; probably yearling; ♀ 40 recent or near ovulation. Fresh digging at edge mound area seen - about 2" deep. No sign green vegetation in hole. A ½" high forb (prob. Cogswellia) sprout next to hole not ~~taken~~ eaten. A few flies seen near holes. Clear warm day with mod. wind. Cold & overcast in afternoon; light snow evening.

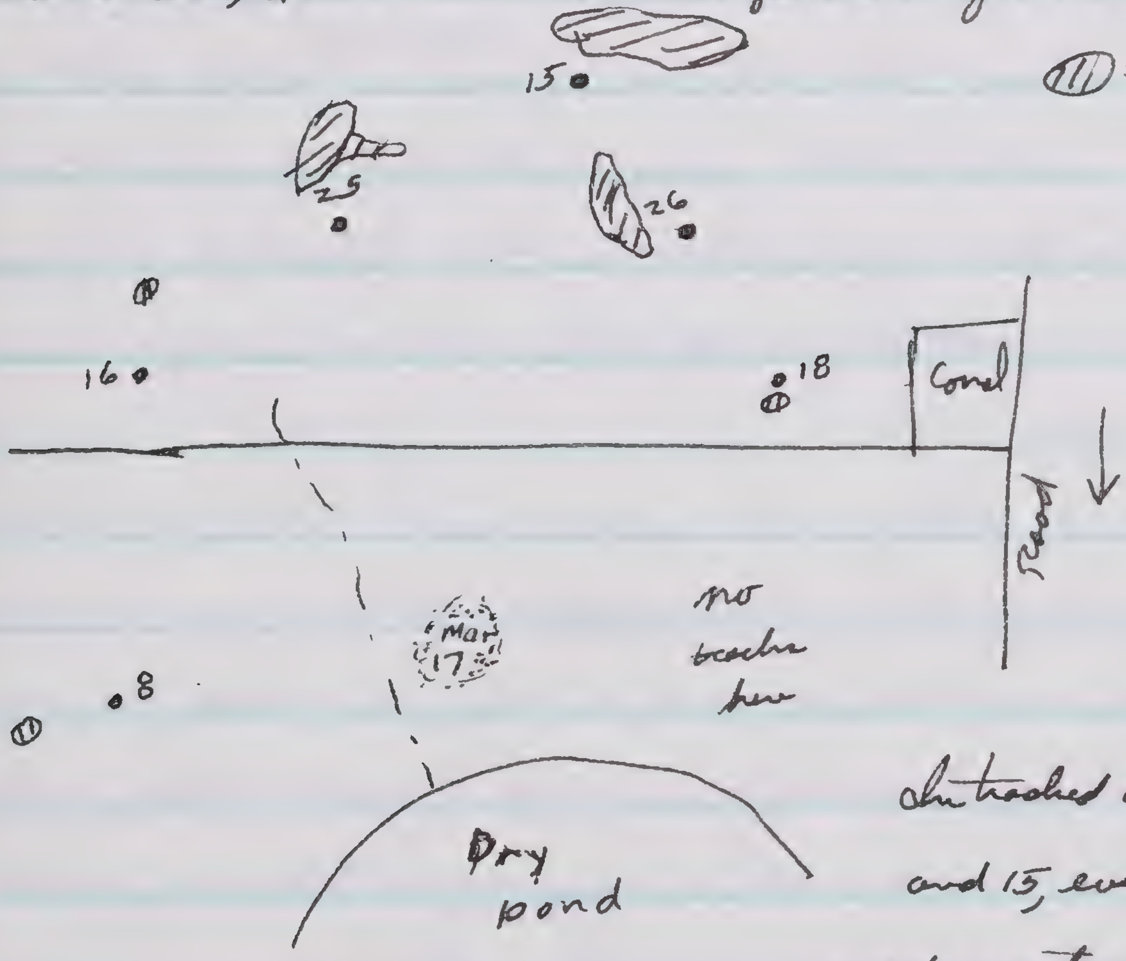
March 16, 1955. Visited same colony 12 m. to 2 p.m. Snow 2" deep ave. Saw 3 out in area 50 yds. SW of trap 15. I searched colony & put stakes by burrows (about 15) where there were tracks. No tracks ~~near~~ at burrows where the 20 traps set. N. of fence, tracks at only one burrow (30 yds. NE of trap 8). In area SW of trap 15, 6 burrows connected by tracks. Some tracks to Chrysothamnus (also Gutierrezia sarothrae; one place) stub, rocks, & cow dung, these being dark objects sticking out of snow. Apparently some nibbling at woody Chryso. stems & at dung. Diggings near burrows from 1" to 4" deep, & at bottom stubs of chewed white roots 1/8" diam. In vicinity trap 26 & to N., two burrows 30 yds. apart connected by 6± sets tracks in fairly direct path. Near trap 25, tracks went 30 yds. out on E. & W. sides of a central burrow, but a hole about 5 yds. from eastern limit tracks. In same area one

Cynomys ludovicianus

March 16, 1955 Nr. Ft. Collins, Colo.

burrow showed tracks , & none connecting to other holes; max. distance from burrow 3 yds. Two burrows ~~also~~ had tracks indicating that one had come out to mound only, & gone back in. Apparently at least 9 animals still left in this colony. About 1 p.m. an eagle flew over – first I have seen close to Ft. Collins. Extensive mouse tracks seen in three places near dry pond. Rabbit tracks not on colony but in area around it. Took several photos of tracks in snow,

Ⓘ = areas tracks



In tracked area near 26 and 15, evident tracks made yesterday too.

Chrysothamnus bases definitely eaten.

March 17, 1955 Nr. Wellington, Colo.

About 9 a.m. visited Wellington colony. Wind about 30 mph. & cold (< 40°F.). Four seen out (Charlie & partner, & 2 others, one beyond fence in overgrazed area to S.). Ground about 8/10 snow covered. // At 1 p.m. visited Spring Canyon Dam colony & searched for activity. Snow soft, air about 34°F., & 10 m.p.h. wind. Very little activity, judging by tracks. One near

Cynomys ludovicianus

March 17, 1955. Nr. Ft. Collins, Colo.

18 showed tracks out & in (same hole as yesterday); one had opened snow hole to surface N. of trap 15, but no tracks outside. Only other activity at a burrow 40 yds. W. of no. 6, where no activity noted before, & one 15 yds. S. of this (snow tracks on one previous occasion), these two connected by tracks. Much activity to 15 yds. away out in 3 directions from main burrow, & some scratching out at burrow mouth. Tracks to usual rocks & cow dung, but also to several spots where partly eaten opened Xanthium burrs. ~~Perhaps~~ about 20 of these seemed to be freshly opened. These burrs (numerous) common ~~at~~ on dry lake bed. Tracks also at no. ?, where tracks out to 5 yds., & green-barked stems of short Chrysothamnus definitely eaten. Much ground with rhizomes = stolons of Buchloë exposed, & near burrows, but apparently these not destroyed by Cynomys.

N.E. Larimer Co., Colo.

March 18, 1955. Clear & warm. Much melting of snow. At about 9:15 a.m. arrived at Sec. 10 colony 1 mile W. of Rudy Ackerman's house. Area with prairie dogs extends from near NE corner of section a distance of about 1/4 mile to S. & 1/2 mile to W. a few burrows at W. edge of Sec. 11. Ground 8/10 snow covered. Ground cover blue grama, buffalo grass, ring muhly, with spaces between up to 12" or more at some sites, & Atriplex canescens, some growing 2' high but mostly cropped to an inch or 2 high. No cattle present. Colony on gentle slope, mostly 1-3%, but on slopes up to 10% on bordering hills. Little rock in soil or mounds, but rock exposed on crests low ridges (shallow soil limits ~~steepness~~ C. l. on steep slopes?). Two burrows about 8" diam. & perhaps bored out by Lepus or Taxidea. One set of 2 carnivore droppings, not fresh, picked up. No coyote or carnivore tracks

Cynomys ludovicianus

March 18, 1955 NE Larimer Co., Colo.

found. An eagle seen 1 mile distant & 1 *Buteo lagopus* over colony. One burrow (crater around) had *Lepus* tracks going out in snow (*L. townsendi* uses *C. l.* holes prob.). One *C. l.* had dug hole out thru snow plug in burrow mouth. Scratchings at mouths some burrows in damp soil, but no pocketing of soil or obvious ~~for~~ mound repair. About 8/10 of burrows snow plugged. Possibly had been some poisoning here, but dogs well scattered over whole colony. Two seen at one burrow on several occasions. I shot 5 for examination & missed about 5 others. Tamest can be approached to about 70 yds. Where one had fed, many small scraps *Buchloë* bases. No greenery here apparent yet on surface. *Opuntia* about 1-2" high & not conspicuously eaten; less amount than on Sec. 22, CPER. Probably this colony will be shot at rather heavily because next to road on N. Within 50 yds. of road but not yet crossed it to Antelope Refuge (heavily overgrazed area). Burrow spacing 10-20 yds. where many. Low limiting slope - why? Probably will poison here this year. // Then 1 mile S + ½ mile E. of Rudy Ackerman's I shot (in Sec. 13, N. edge) a ♂ (♂ #6) that was with another dog in burrow 50 yds. from road. A few other fresh appearing mounds in that area but no other tracks. Apparently had been small colony here of a few acres. In S. W. ~~half~~ quarter of Sec. 13 & apparently had been old colony for large regular mounds of gentle contour. Where the ♂ shot, slope 1-3% & grasses apparently mainly ring muhly & *Buchloë*. Bare spaces a ft. wide between vegetation. *Atriplex* common but only 1-2" high. Old gentle mounds on nearly flat ground but streamlined at edge terrace drained it. // I drove to Sec. 22 colony at CPER

Cynomys ludovicianus

March 18, 1955 NW Weld Co., Colo.

where little snow (but much ground wet from melting). about 1% snow on colony. From W. end about 30 *C. l.* seen out. Clear & warm when nearly calm. At W. end to N. of fence, 4 at 1 burrow, & just SS. of fence 20 yds. from there, 3 at 1 burrow. No fear now of my closed traps by these two burrows; one fed in shade of a trap. I watched one eat an 8" long stalk of green barked *Chrysothamnus* from base to tip, holding it in forepaws. Later I found several stalks cut at site & lying on ground. One of 4 went 30 yds. from rest & fed at *Opuntia*. Two of 4 fed at one *Opuntia* clump same time, & 1 of 3 on another clump. They scratch at leaf with dog-paddle motion both forefeet (remove spines?) then bite & tug with teeth. Later exam showed freshly eaten segments green leaves *Opuntia* there. One gathered dry grass in its mouth—probably *Bouteloua gracilis*. Nearly flat ground of bottom to S. of streambed near center of colony seems favored—at least 8 there at once. No green grass yet apparent on surface here. Predators not too active for a prairie dog carcass I left in open on hilltop was still untouched. I saw a *Sylvilagus* in two burrows. On previous trip saw 1 in one of these same burrows. *Parmelia* might be eaten for scraps in burrow mouths. At another site where scratching ground seen were tiny scraps *Opuntia* leaves & hard roots (possibly eat; white, succulent); a detached broken leaf a few yds. distant. I baited the 15 live traps & departed about 3:30 p.m. // At 4:45 at Spring Canyon Dam colony I saw none out & found none in traps. Took up traps no. 4, 8, 11, 12, 20, & 23, & sprung rest. Snow now gone from colony & occasional blades green grass near burrows. // a mite & louse as well as usual many fleas found on those collected.

Cynomys ludovicianus

March ~~18~~ 19, 1955   NW Weld Co., Colo.

about 2 p.m. visited Sec. 22 colony & saw several out near my traps, but none in & bait gone (release not work or mice eat bait?). Overcast but no wind. Pocket gopher or Dipodomys scratchings on a sandy hill at just beyond W. end of colony. March 20 - snowed about 3".

March 21, 1955   Boulder, Colo.

Paul Maslin of Biology Dept. has had some experience in collecting rattlesnakes in C.l. towns. He said that the snakes wintered in unoccupied burrows, going in in October and emerging in mid-May. For a few days at these times a man had to be very careful in walking around in a colony. Sometimes about 7 snakes came out of one burrow & rested on mound or in entrance. He thought the prairie rattlers too small to feed on C.l. so probably not a major predator. Maslin said there used to be a large colony 8 mi. SW of Ft. Collins & another 20 mi. NW of Greeley. He also told me of an M.A. thesis at Colo. Univ. written by a student named D. D'Ostilio. This had some information on predation on C.l. & by eagles. another student named Ronald Smith was going to work on prairie dog ecology & had done some work in Nebraska. Formerly there were dog towns near Boulder but now few dogs left because of poisoning. A salamander Ambystoma tigrinum was sometimes found in C.l. burrows (check if actually seen). Maslin also said active burrows could sometimes be identified by fact ~~that~~ flies entered, presumably to lay eggs.

March 22, 1955.   Denver, Colo.

Charles Sperry says that Salsola does not grow in C.l. towns but only around them; apparently they keep this weed down. Charles Hanson, an amateur snake man, told me that about 1947 in a dog town NE of Platteville he collected 63 Crotalus in an

Cynomys ludovicianus

March 22, 1955 Denver, Colo.

area of about 160 acres one day in October. At that time the snakes were already in dens but had come out on a sunny day. I met Ray Fugate, in charge of Predator + Rodent Control in this region, + his asst, Lowry. They said that in the area east of Palmer Lake, 7500 ft., on crest between Arkansas + Platte drainages, there were prairie dogs that seemed to be hybrids between the black + white tailed. These produced young ~~both~~ both early (fairly well grown in May) + late (1 pregnant in Sept.) in the year. Control of them was difficult. What range condition? They thought range fair in that area. Mr. Higley owned much of land that area (former Lt. Gov.). New highway, thru Greenland, has dogs both sides. SSW of La Junta there is an area of ghost towns, said Fugate, on an L.U. project. In some counties, such as Cheyenne, no control in recent years, + little in Kiowa Co. At Extension Office in Ft. Morgan should be record of a vegetational survey made in a prairie dog area (Crouch should know of this). Most control difficulties were with Gunnison + Zuni prairie-dogs. Poison now worthless in some areas as animals would not take it (in SW Colo. especially).

March 25, 1955 Nr. Ft. Collins, Colo.

In afternoon visited Spring Canyon Dam colony. About 3" cold new snow, + temperature about 15°F. No sign of C. l. activity at any burrow.

March 26, 1955. Visited same colony 2:30-4 p.m. Much melting of snow today, but not cool. Examined all burrows where traps had been set or where tracks seen after last storm. I saw 4 C. l. out on snow at 2:30 p.m. One allowed approach to

Cynomys ludovicianus

March 20, 1955 Nr. Ft. Collins, Colo.

150 yds. Two seen about 40 yds. S. of #20. Tracks out 5 yds. from one burrow to exposed *Opuntia* leaf, which had fresh surface 1/2" x 4" chewed. Spines + pieces scattered on snow. At #11, many tracks, 5± sets going NE thru fence to other burrows. Tracks also 15 yds. S. to open burrow, another 5 yds SSW of that one, + others another 15 yds. to S. Dung (cow) evidently nibbled. Then 50 yds. S. of #12 (where no tracks), where one staked after last snow, tracks out two directions from burrow to distance 5 yds. Cow Dung, which sticks up above top snow, visited. / #26 burrow used. From it tracks 5 yds. W. to cow dung, 10 yds. E. to exposed dry short grass, + to dung. *Chrysothamnus* stem (stubs) nibbled 2 sites, green *Cogswellia* shoots an inch tall cut off at ground (top left), moss 1/4" high scratched up at one spot. One place dug thru litter to 1/4" diam. *Chryso.* root. Tracks from 26 to burr. 10' to S. + on to S. 10 yds. Staked burr. where 10± sets tracks last snow now has none (+ none at #26 after last snow). / Burrow #14 + #15 open, with tracks, + connected by tracks to one 20 yds. NNW + another 20 yds. NE of that one. These last two with little mound (not new); only about 3-4" deep. One track nearly straight for 40 yds. between 2 burrows. Pieces woody *Chryso.* stub 1/8" diam. cut. Heavy use of 1/4" *Chryso.* stubs 1" high near #15. No green leaves on these. Tracks also to 5 yds. E. of #15. Green stalks *Cogswellia* cut off here too (only new green forb - has big root deep down, apparently). Some digging to 3/4" deep after this plant. Burr. 5 yds. SW of #15 also open. Tracks ~~one across at~~ ~~cow track~~ to 20 yds. ~~NW~~ W of #15, where more *Chryso.* taken. Tracks to S. connect to nearest of 5 burrows there, near *yucca*, staked after last storm. No other tracks near these burrows ! tho much after last storm. 5 burrows in SE pt. colony have no tracks

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near (staked after last storm). No tracks at 18, 20, 12, 17, 25, 16, or any trap sites to N. of fence! But much near burrow 50 yds. W. of #6 ~~the~~ that was staked after last storm. From it many tracks to N. onto edge dry pond bed for 15 yds. *Xanthium* burs apparently taken. Some freshly opened. Some missing *seed* only (& brown seedcoat). Also from this hole tracks to 2 burrows 15 yds. ~~W~~ S., & on to 30 yds. more SW (one dug out at mouth somewhat), & on 12 yds. to open crater, 10 yds. more to fence, & on to ~~Bo~~ #11 (this about 75 yds. air line from staked one). Little sign of feeding along tracks. 5± sets thru fence. No tracks in N ~~S~~W 1/4 of colony (trapped ~~out~~ or moved?). No building of higher mounds or digging new burrows. Main foods = *Opuntia*, *Chrysothamnus*; then *Xanthium* (nr. pond), *Buchloë* (incl. stolons & pistillate florets), *Cogswellia*, & prob. *Bouteloua gracilis*. No green grass apparent in colony yet. Some areas pure *Buchloe* in sparse network stubs & stolons;

March 27, 1955 NW Weld Co., Colo.

Arrived 11:20 a.m. at Sec. 22 colony at CPER. Snow up to 1 ft. deep in drifts, & wind packed, but half ground snowless. Many *C. l.* out, including 3 at burrow just N. of fence at W. end colony. I examined snow tracks + put wooden stakes at burrows with tracks. Tracks showed visits to farthest N. burrow (N. of fence, W. of streambed), + SSE from it for 30± yds. to where 3 *C. l.* seen. Then 5 yds. S. of fence, at W. end colony, tracks to *Chrysothamnus* & *Opuntia* nibblings; one set to this area from burrow 45 yds. S. of it, + 2 sets to last from 30 yds. more to S. 32°F. in shade, clear, light breeze, snow softening. About 150 yds. S. of fence & W. streambed, group of 3 burrows used, 15 + 7 yds. apart. On N. side streambed on central low hill, a group of 4 burrows in snow with tracks between & near. These spread over 50 yd. diam. Apparent *Buchloe* stem bases torn up in

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spots (so bare ground), heavy use Opuntia at 3 sites (took photo), parts of Salsola cut off & scattered on snow $\overset{2'}{3'}$ from burrow; one burrow used tho snow entirely hid mound (hole in snow photoed). Tracks upslope to N. to within 10 yds. of fence. No tracks over 10 yds. outside outer burrows. Some burrows within boundary & many (mostly shallow) outside of boundary show no use (peripheral burrows shallow & not permanent at first?). No signs building mounds or new burrows. No newly green forbs or grass apparent. A plant of Astragalus mollissimus (?) with 4" leaves ~~grown~~ grew close burrow but not eaten. On same low hill about 100 yds. W. of these burrows, 2 30 yds. apart used & many tracks. I saw 3 or 4 C. l. at one of these upon arrival. Evident feeding on green Opuntia & scratching up of bases dry grass (Buchloe?). On flat area packed ground ~~[illegible]~~ in bottom, 2 holes 5 yds. apart open & apparently used by Sylvilagus. Another group 2 20 yds. apart about 200 yds. SE of fence on W. side streambed had ~~tracks~~ & chewed Opuntia leaf, green. Another group of 3, 15 yds. apart, 1 on the flattest bottom with slight mound (~~#~~ 1% slope?), others up steeper slope. Some apparent old or shallow higher on slope than any used. Spacing far for most part. I think oldest part colony on N. side streambed about 100 yds. W. of E. fence-line - closer spacing. One burrow had 6" long 1/2" diam. Chrysothamnus shrub base in mouth, & 4" long central stalk Salsola with stubs of branches. Salsola used for nest material? // On S. side streambed near E. end colony, 3 burr. used. One with 3/4" diam. clods dug out as if by badger or Lepus. To E. of E. fence, 3 burrows showed activity. Farthest E. on 5% S-facing slope & had many tracks; Opuntia eaten & broken at 3 sites within 20' of burrow. Same eastern burrows as earlier found used. Some 2"x2" pieces green Opuntia broken off. I saw 3 flies, 3 tiny grasshopper nymphs. 10± antelope 1/4 mile S. of E. end colony. Last E. burrow 35 yds. from next used one, & 100 yds. from N-S fence. One only 10 yds. E. fence. All E. of fence

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found used area on N. side streambed. E. of fence less grazing utilization than in SW 1/4 of Sec. 22. ~~Chryso~~ Chrysothamnus about 8" high, Aristida 8" tall. In SW 1/4, much Muhlenbergia on slopes on S. side streambed. Another 2"x2" piece green Opuntia in burrow mouth. Much eating & breakage of this, but still much left near burrows (heavy use only this season?). Took photo of colony from W. end. No carnivore tracks seen in snow, nor fresh carnivore droppings. But found legbone of Lepus, ~~not too old~~ perhaps a month or 2 old, near mouth 1 burrow. Saw no eagles here but one about 2 miles to SW.

March 28, 1955 Nr. Ft. Collins, Colo.

Arrived at Spring Canyon Dam colony 9:30. Snow nearly gone but patches make obs. difficult. Clear & about 40°F. muddy. Saw ~~one~~ one C.l. out at burrow 23, 27, & 16. No traps are set now. Spent most of day on colony making maps. Map shows burrows where traps set or known to have been ~~not~~ used as shown by obs. or snow tracks. All holes or burrows present not shown. Some well built craters to W. of S. part colony but no activity has been seen there, probably because of shooting from road. The 3 burrows where 1 seen out were not used Mar. 25 or 26 as shown by snow tracks. May stay down 2 days even now. Cogswellia leaves up 2", & a few ~~others~~ new green forbs ~~on W.~~ beyond west side of burrows are ½" to 1" high.

March 29, 1955 Laid out 100' Parker loop ~~transect~~ in area N. of #11 traps, Sec. 33, SW 1/4, ~~Departed~~ with help of Robert Gardner of USFS. Paced transect with 3/4" loop from near #33 to near #9 & then to near #24. Result plant density index 50, ground cover index 30. Of 100 hits, 27 bare soil, 23 litter. Most grass is Buchloe. The 100 ft. permanent line transect gave 4 hits on bare soil, 9 on litter, 87 on plants (all or most Buchloe). Litter often 1/4" thick. Grass & litter cover fairly continuous with few bare spots. Departed 11 a.m.

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Returned 4 p.m. & saw 7 out; 1 mr. #28, 2 mr. #15, 1 mr. #34 (no prev. activity noted there), 1 mr. 17, 1 mr. 16, 1 mr. 10. Set traps at #15, 5 yds. SW of #15, 23, 25, 26, 27, 28, 34; steel traps, buried. Saw a Sylvilagus at mouth burrow 10' E. of #29 where C. l. tracks after a recent snow-storm. It stayed while I walked to pt. 20 yds. distant. / Earlier in p.m. visited colony in Fossil Creek just E. of Taft St., SW 1/4 of Sec. 3, T 6N, R 69W. Saw 20± in 40 A area. Apparently former large colony, these being remnant after poisoning. Heavy utilization of pasture - much bare ground. Most concentrated near small dammed pond, wet bottom. Many tracks in mud. Some to 100 yds. from road. Apparently dogs widely scattered, not concentrated. About 1/2 mile to W., many burrows on hillside facing E. // Then saw 2 near crater burrow in SE 1/4 of Sec 33, 1/2 mile E. [Pump Col.] of Spr. Can. Dam Colony, where broad valley with many old burrows (I examined this area once long ago). Active burrow had 15± diggings within 10 yds. These fist sized burrows from 1" to 4" deep. In bottom of several was exposed chewed end of 1/8" to 3/8" diam. white juicy root with tan outer coat (saved for ident.). Cogswellia with 1" leaves in area, also green grass (~~Stipa?~~) (asm?) occasional plant to 6" high, but none eaten found. Took 4± photos (2 1/4") of diggings. 5± burrows in 50 yd. diam. seemed to have been used recently. The 2 seen about 200 yds. W. of county dump, where many people shoot at junk targets.

March 30, 1955 At 11 a.m. arrived at Spring Canyon Dam colony. I saw none out. Rabbit fur in sprung traps 100 yds. W. of #26. I moved this traps (#34) to a site about 100 yds. W. of #15. ♀ 47 in traps 15, ♂ 48 in traps 5 yds. SW of 15, ♀ 49 in T. 27. Killed these. No activity at burrow #16 so set traps 10 yds WNW of it. No activity at #10 so set traps 15 yds. N of it.

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Also set traps at #~~30~~ 33 ? & 35 (not trapped before). No activity vicinity of 24. Saw ants here for first time this season. Moderate numbers flies of 3 or + kinds near burrows. Same flies on C. l. dung. Evidently there has been abandonment some parts colony though all were no trapped out (as near 24 & 21). Some burrows formerly old appearing have been opened (by rabbits or C. l.?). Saw Sylvilagus at same burrow as yesterday (it went down into). Many fleas on trapped C. l. One froze lying flat on stomach, but breathing, until I was 7 ft. distant. Took 2 photos area. Staked out 150' X 100 ft. standard plot around permanent transect

. Found 8 burrows E. & 8 W. (incl. one at #5. center) of transect. 6' from No. 23 were diggings to 3" deep. End of chewed root 1/4" diam. in two. Pieces sound. White juicy root. ♀ 49 first pregnant female caught. ♀ 47 not pregnant. ♂ 48 had male strong smell, sperm, & small amt. semen in sheath penis. In stomachs, one insect antenna no ~~(foot?~~).

March 31, 1955. Strong wind (30mph) & overcast. At 11 a.m. visited Spring Canyon Dam colony & found ♀ 50 in trap 25 (prob. not out of that burrow; no tracks). Saw no others out, nor tracks. Cleared in afternoon & less windy (20mph). At 5 p.m. found ♀ 51 in trap 27, ♀ 52 in trap 28. [this = 32 trapped this colony]

April 1, 1955. Clear, not cold, 15 mph wind. At 9 a.m. at Spring Canyon Dam colony I saw 14 out, well scattered. I was surprised to see one on mound #5, where none seen for long, another at #22, & 1 near crater 60 yds. E. of #5, λ. Diagram of sites where seen on next page. Took up all traps. One seen 30 yds. N. of 24, where 1 or 2 seen a few weeks ago. Evidently there has [or emergence hibern.?] been spread & movement, & reopening of many old burrows. Trap gone at 11 - probably

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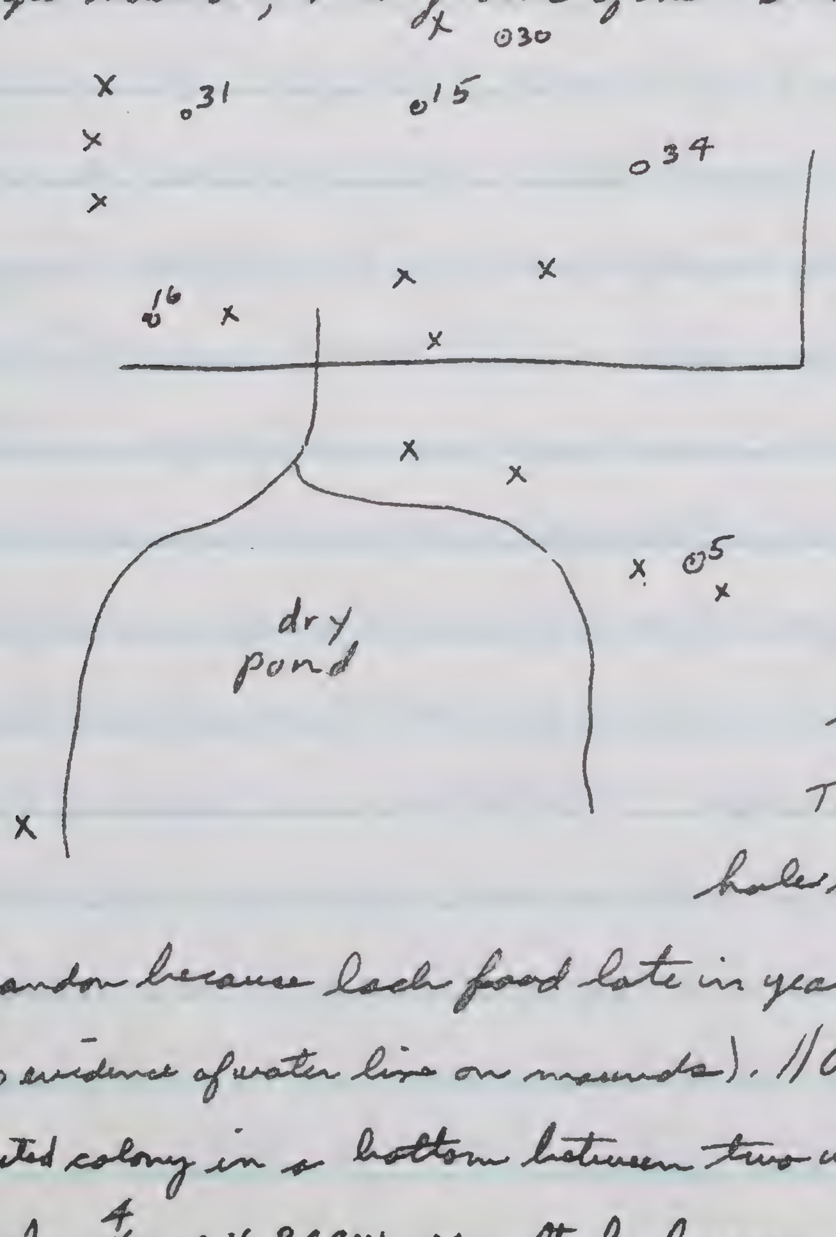
forgot to ~~stake~~ it down. Three burrows show new tracks & digging out of dung & trash on hillslope 40 yds. E. of #31 + 32 (3 seen feeding ~~that~~ area). Grass there no greener than elsewhere, nor more forbs coming up. On that slope took slope measurements highest burrows. Max. 11% on topog. scale. ~~(1'/chain)~~ (= ft./chain ?). Heard a C. l. in one of these. One seen & 2 burrows apparently newly used 30 yds ESE of #30. No C. l. seen near 12, 15, 18, 20, 26, 27, 28, 29, 30, 35 area. (On same ~~stope~~ slope used burrows only up to 6 Topo. ~~slp.~~ slope). Steepest old burrows (mound a few" high, lower side only), about 30' from solid erosion pavement of rocks to 1½" diam. // In area of #22 + #5, relatively much Cogswellia, some only 1" high but with flower, leaves to 3" long, but no evidence eaten there. Some Cogswellia on edges mounds, & cotyledons of new dicots coming up (saves some).

~~Topo. scale~~
~~3/~~
% slope = 3/2 × Topo.



x x are locations where C. l. seen 9 a.m. at least 14 left in groups.

In area of #7, two mounds out on dry lake bed about 40 yds. in area where no grass, but Salsola, Xanthium, Verbascum. These mounds not raw ~~used~~ but holes still open. Ground nearly flat, abandon because lack food late in year there? Or water table high (no evidence of water line on mounds). // About 3 p.m. with Joe Hopwood visited colony in a bottom between two wheat fields (now being ploughed) in Sec. ~~3~~ 4, T6N, R69W. Mr. Stroh, lessee, said the C. l. dug up planted

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seeds & ate out areas of green wheat. Last year, first time this area planted, crop poor because "burned up," said Stroh. I saw 20± C. l. on area of about 5 acres near canal. Little or no Buchloë here, but very closely grazed bunch grass. I saw some out in ploughed ground, & some burrows there, but some food there too as ground not recently ploughed. Well formed craters & mounds. Several craters had second entrance in side of packed mud crater top. Saw ~~some~~ two one at 100' range – tamer than Spring Canyon Dam bunch; probably shot at much less. Much digging to 6" deep in bottom. ~~Some~~ Only prominent bush Chrysothamnus. We set 7 steel traps, buried, on mounds. Less greenery here than Spr. Canyon Dam – a good contrast in same climate & soil (?). Soil loam & easily dug with hand.

April 2, 1955 NW Weld Co., Colo.

Arrived Sec. 22, CPER, about 11:30 a.m. Warm & partly overcast. Saw from W. end about 20 out. Took up all live traps. Worked at laying out colony into 2 chain square plots. Some fresh eating of Opuntia green leaves. Found digging of holes to 5" deep about 14 chains W of E fence on slope & near stream bottom, where standing water & mud. One forb (Cogswellia?) showing near N. fence. A few cotyledons near water. Generally no greenery could be found. Wettest sites seem to have Buchloë stolons mainly. At bottom of 4 holes dug & investigated, 1/4" diam. chewed off white root with pale brown covering (saved for ident.). Found 3/4" long white grub in soil next to 1 digging (not eaten?). Wind about 30 mph from E. at 3 p.m. & dust blowing.

April 11, 1955 at CPER, Klipple told me ~~that~~ there had been a dog town in Sec. 15 E (some 15 W) ~~that~~ was poisoned about

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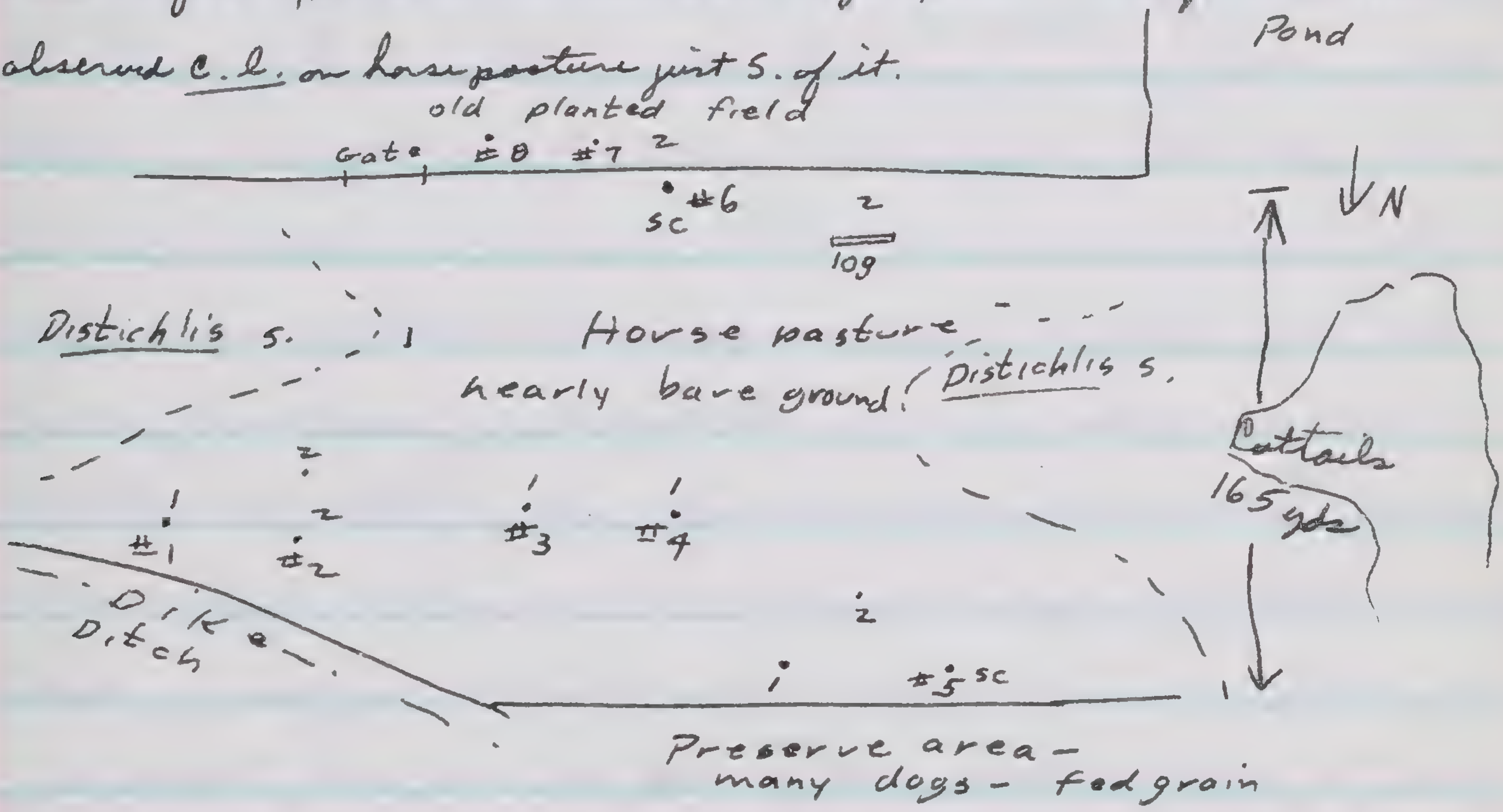
1938. Then there was a single dog seen there for a few years (presumably a male) until 1952. Another then seen there (♀?), & soon both gone. Perhaps a good place to look for effects on succession.

April 12, 1955 NE Larimer Co., Colo.

Clear & frosty, little wind. Arrived Wellington preserve colony 7:50 a.m. & observed *C. l.* on horse pasture just S. of it.


Pond
old planted field
Gate
#8
#7
2
sc #6
2
109
N
Distichlis s.
Horse pasture
nearly bare ground!
Distichlis s.
Cattails
165 yds
2
2
#1
#2
#3
#4
Dike
Ditch
2
#5 sc
Preserve area –
many dogs – fed grain

Counted 16 *C. l.* about as above. Staked 8 burrows. One *Speotyto* seen at #5 (1 pellet found), two at #6 (two pellets). Three horses in W. part pasture. Most ground bare, with occasional base of cropped grass. Large areas *Distichlis stricta* about ~~4~~ 5" high with some *Kochia* mixed. Burrows rare in this (drowned some season?). At 8 a.m. one (3 black spots left side back, none on right) ~~50~~ 40 yds. ~~At~~ W. of #4 gathered large mouthful grass (*Distichlis*) (& prob. Kochia) about 6" long & carried this crosswise in mouth to #4 & down into burrow. (In walking passed 10' from killdeer on ground; no reaction). Another (appar. from #3) came to entrance. The first out 1 min. later. They nosed each other nose, mouths open. One ~~jo~~ then gave jump up & call, then other. Scarred one went for more grass. Other sat mouth burrow #4. Scarred one into *Distichlis*

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April 13, 1955.

50 yds. from burrow, gathered grass, back to #4 at 8:09 & down into with bunch of dry grass (+ Kochia ?). Other one ran to #3 as scared one approached. // In area I picked up 5 Speotyto pellets. These contained insect parts mostly, it appeared. One large coyote (?) dropping found. String of 5± C.l. droppings connected like necklace - due eating long fibrous food? Saw one Citellus 13-lineatus in a C.l. burrow mouth on preserve. Set 5 live traps in horse pasture, 3 steel traps in preserve. departed 10 a.m. At 6 p.m. took these up. Caught ♀ at #3 & kept alive. Two in steel traps. These killed. One advanced pregnant, belly + forehead apparently molting. // Jim Lawrence told me he saw ~~one~~ on old poisoned town near his house (formerly many; he thought this survivor, not new arrival). // At Sec. 22, CPER, colony, from W. end counted 16. At NW extremity, 1 N & 1 S of fence at usual sites. At least 3 on ~~sw~~ very flat but gently sloping ground just S. of ~~ce~~ streambed in center. One 50' N. of fence, 200 yds. W. of E. fence. Burrows formerly seen there but this first C.l. One of highest burrows on S. center also had dog. Feeding mostly on lower areas. None seen outside line of outer burrows. // I set up 10' × 10' prairie dog exclosure at NW end colony just N. of fence. This will be surrounded by 30' × 30' barbed wire cattle exclosure. One side of large exclosure is fence. Same laid out at SE end colony. // about 4 p.m. I saw 4 in bottom & E. of E. fence. Upon alarm, one ran to farthest E. (formerly staked) burrow. I wounded one 30 yds. E. of E. fence but it got down burrow. (This burrow horizontal for at least 2' about 6" under surface ground). // Saw cottontail at burrow just S. of bottom & 100' W. of E. fence (stake there). The mound of coarse texture (1" clods) so that formerly I suspected badger dug it out. Four Antilocapra seen near S NE corner of colony 4:30 p.m. I set 5 steel

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April 13, 1955 NW Weld Co., Colo.

traps in center colony about noon. Took 1 small male by 4:30 p.m. // Met Bob Hoover of Game + Fish Dept. He told me of a few colonies. I ~~[illegible]~~ marked them on map. The Buckhorn colony was thriving a few years ago, he said; he was surprised that there were none there now. //

~~April 14, 1955~~. Two in steel traps on preserve. One apparently parous ♀, other small ♀. ~~NE Larimer Co., Colo.~~

About ~~10 a.m.~~ 6 p.m. arrived colony 2 mi. E. Wellington. One in live traps (♀, the one from #3, seen to rub noses with one packing nest material yesterday). This I kept alive for observation. ~~wt.~~ Cut left toe III+. Vulva closing? - opening somewhat stuck closed. (at 10 a.m. Apr. 14 weighed 800 gms, Nipple 3 mm. long. Probably pregnant. Kept in cage). A Citellus 13-lineatus taken alive too.

April 14, 1955 NE Larimer Co., Colo.

about 10 a.m. arrived colony in horse pasture. Saw a Citellus 13-lineatus. A cottontail in live trap to S. of S. fence near gate. (♂, weighed 1125 gms.; I cropped R ear ⊓ + left foretoe III+, Released it). Saw several C. l. + 1 owl (Speotyto). Spent a few hours in starting map of area. Burrows down to Distichlis stricta in bottom + ~~some~~ in edges of it. Met Mr. Grass Gross who owns this pasture. He said no prairie dogs here 4 or 5 years ago + pasture fairly good. Then sheep grazed there part of year + potatoes spread on ground for feed. Prairie dogs ate some potatoes. Sheep ate grass down to bare ground. Three horses here now. Plans to reseed crested wheat grass. To S. on hill was planted wheat field (of last year) with some burrows in edge. Gross had not noticed that C. l. had eaten much wheat. He was planning to put alfalfa on same field this year, starting to plough in about a month. Little shooting of ~~[illegible]~~ C. l. here, according to Gross. He said area of preserve had not

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April 14, 1955 NE Larimer Co., Colo.

been grazed during the 12 years he had been here (still has heavily grazed look, however - due to C. l.?). He had been thinking of gassing dogs on horse pasture. // As nearly ~~base~~ bare ground nears bottom, low Kochsia commences, then mixed with Distechlis, then pure Distichlis & thick.

April 15, 1955 NE Larimer Co., Colo.

I drove to Rudy Ackerman's, about 20 mi. N. of Ft. Collins. In Sec. 13, where took ♂ 46, saw 1 at about same burrow. Put steel trap there. (Caught a cottontail by afternoon). I was not able to see any other C. l. this area. // Talked with Rudy. He said he did not know what caused large low regular mounds at N. end Sec. 13 - I think Pogonomyrmex largely responsible. The mounds rather rocky, about 10 yds. across, & many with ant mounds on them now. // Wellington preserve - saw dung beetles rolling C. l. dung yesterday near mouth burrow. Collect this? // Sec. 13, where ♂ 46 shot, has fair cover Muhlenbergia & Bouteloua (?), only about 10 % bare ground, some Opuntia, some 3" high Atriplex canescens bushes. // Rudy said formerly C. l. in Sec. 12 to N. near old Grimm place, & formerly many on Clarence Munro place between two branches creek about 2 mi. NW of Sec. 12. He said he & another man shot up 8 boxes. 22 shells there one day shooting ~~at~~ at C. l. without getting out of truck. In Sec. 23 he said there had been dogs as long as he could remember. When CCC had poisoned the region, poison ineffective in that area. }} On Sec. 23 I set 12 steel traps. Many diggings by prairie dogs to 4" deep. At bottom many was eaten off top of root. Most roots were white inside with yell-

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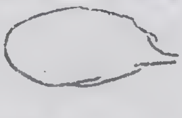
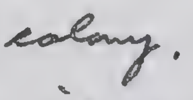
ish-brown bark. One was apparently *Cogswellia* root. In 10± diggings tops of *Cogswellia* (entire leaf) left on ground. In same, green tops of leaves of an onion with 2" long leaves taken. In others the onions eaten + husks left. Onions good to eat, wild flavor, + about  in size, but 4± growing in cluster. A great deal of *Cogswellia* undisturbed, even next to diggings – the same with green grass with new leaves to 2" long. This pasture severely depleted, stubs of *Atriplex* bushes, 90 % bare ground. Collected some of the eaten roots for later identification. New blades grass 1" high within 2' of burrow mouths (some) not eaten. *Cogswellia* in area has leaves about 1" long max. A few burrows dug in old (?) *Pogonomyrmex* mounds. // One burrow was in 8' wide mound containing many shale flakes to 1½" long. Large hole as if badger dug out long ago. Recent scratchings all around to 3' distance, throwing up loose mound around burrow, 4" high. Another badger dug hole 10 yds. distant, without shale, ~~or rocks~~ about 1/4 gravel, ± also had scratchings of p.dog all around + 6" high loose mound. Scratchings about 1" deep. Another burrow (periphery colony) had mound recently built up too, scratchings to 8' distance, 1" deep, in amoeba-like pattern  (~~♂~~ ♀ 62 CBK trapped there April 16). // No *Citellus lineatus* seen this colony. At least on E. side, toward streambed 200 yds. distant, peripheral burrows occupied. Took some 35 mm. Ektachrome photos of diggings + mounds. Sec. 23

April 16, 1955 About 10 a.m. ~~too~~ checked 12 traps. Took 4 *C. l.*, 2 ♂♂ (no. 60, 61), 2 ♀♀ (nos. 59 + 62). Some other traps sprung, one with toe in it. Took 4 photos (black + white 2¼ square) to show range condition. Burrows here *widely* spaced (measure later). // 4/10 cumulus, 20

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April 16, 1955   NW Weld Co., Colo.

m.p.h. wind. // Drove to CPER. Finished setting up 2 10'x10' exclosures for C. l., one at each end colony. Photoed E. one. Some grass to 2" tall & green now. This is first appreciable green grass found away from water. Snow in bottom has melted to pools of water. Saw one Uta stansburiana - first seen here.

April 18, 1955   Nr. Ft. Collins, Colo.

At 9 a.m. of sunny warm day arrived Spring Canyon Dam colony & saw 12 C. l. out. Two at burrow 50' N of #7, on dry pond ~~bot~~ bed ~~, ±~~; one at #10, one 100' SE of #11; these 4 only ones N. of fence. S of fence: 2, 50' S. of #16; 2, 50 yds. S. of #16; 1, 50' N. of #13; 1, 50' S. of #13; 1, 50 yds. SE of #3, 1, 10' N. of #18. Population well scattered, not bunched, apparently. None seen in NW part. Many burrows showed scratching out of loose dirt but little other use. #11 had spider web ~~cobweb~~ over mouth. // Scattered blades grass (Stipa?) to 4" tall here now. Several species forbs growing. Cogswellia leaves to ~~4~~ 5"; some with flower heads now. An overall green aspect from a distance. Set 5 steel traps on mounds near where C. l. seen. Departed 10 a.m. // Visited colony between wheat fields on Fossil Creek, S. 1/2 Sec. 4. Few dogs out, compared to previous visit about April 1. Scattered blades green grass to 4" tall. Several forbs growing. Chrysothamnus 3' tall here. Many burrows in the wheat fields. Mostly in those not ploughed & sowed this year, but 6± on one slope ploughed since about April 1. Photoed some of these. C. l. scats present but possibly Sylvilagus occupies. Grass closely cropped. Not Buchloe but bunch grass (some). On hillslope across fence to W., in SW corner Sec. 4, mostly Büchloe, little new grass, a few C. l., many old burrows. / In Sec. 3, to E. of road here, closer grazing, 3 horses present. Saw several & shot a

Cynomys ludovicianus

April 18, 1955 Nr. Ft. Collins, Colo.

male (Photoed burrow; Ektac. 35 mm.).

April 19, 1955. at 9 a.m. took up the 5 traps at Spring Can. Ran colony. One C. l., ♀ 64 (not pregnant) in trap on mound 50' N. of # 7. Wind 30 m.p.h., 4/10 overcast. Very heavy wind today. NE Larimer Co., Colo.

April 20, 1955. 2/10 overcast, ~~E~~ mild, mod. wind. Arrived at colony in horse pasture 2 mi. E. Wellington 9 a.m. Saw C. l., Citellus 13-lineatus, Speotyto on colony. Burrow # 6 had 2 Speotyto, as seen on last visit. At least 5 burrows now used by owls. (Another in presence near burrow of "Charlie"). Four Circus over Typha but ~~not seem~~ pay no attention to C. ls. Saw Citellus 13-lineatus at 3 sites in horse pasture. These go into C. l. burrows that apparently have no C. l. or mouths partly filled. Four crows perched on fence at N. edge of colony. These flew over a prairie dog at 15' alt. & caused it to run to its burrow (harass C. l. on occasion?). I spent most of the day in mapping this colony. Little invasion of Distichlis where thick, altho a few burrows there (wet underground?). // In late afternoon visited CPER Weld Co. colony, Set 10 live traps & 2 steel traps. Noted 5± diggings about 5" deep that could later be enlarged into burrows. Several old burrows apparently opened up somewhat in recent weeks but perhaps not used since. Spider webs over mouths some - so all burrows not now used. [no - can make in few hours] Russian thistle detritus in others, or green grass or forb growing at mouth (indicating no recent use). New green grass difficult to find. Freshly eaten Opuntia leaf seen. Apparently still dry here & little new food available. // Trapped a ♀ in Wellington preserve (♀ 63). Molting along milk line. Especially vociferous when handled - snarled loudly. Anal glands protruded farther than ever

Cynomys *ludovicianus*

April 20, 1955 NW Weld Co., Colo.

before noted, tho no great smell. // At CPER, one seen to run at least 50 yds. inside colony area. // Scarab, *Canthon praticola*, rolls *C.l.* dung at Wellington colony.

April 21, 1955 With John Reed Retzer & Victor Scheffer visited 7 prairie dog colonies. Retzer is soils man with F & R Exp. Station. In Sec. 22 colony, CPER, A horizon in area burrows at W. end colony contained much hard clay. Bottom soil less claylike. No apparent soil difference, such as shallowness or rockiness, at upper slope limit. Perhaps presence green food at certain critical season determines distribution in colonies to large extent. Possibly occasional flooding keeps burrows out of flat bottoms. Visited also poisoned out colony on Henry Prange (Sec 33) colony (no *C.l* seen). Then C.C. Acre ranch near Rockport. *C.l.* rather tame there & much digging for roots. Heavy over-utilization range here. Then visited Tony Ramm colony & saw a few out in *Atriplex* area. Then Sec. 23 on Rudy Ackermans. Here *C.l.* on dry sites, not dampest near bottom. Colony ran N. on E. side hills to near N. end of the section. About 15% slope maximum grade with burrows. Many mounds about 50% shale chips to 1½" diam. None on top of ridge (nor in other colonies). Briefly visited Sec. 10 colony. Then to Pat Farrell colony near Deadman Butte. Here also much digging at same sites, especially on road. Grass here had much green compared to CPER region. Shot a *C.l.* through stomach - it escaped but a teaspoon of grass from stomach dropped. Retzer was impressed by fact that few burrows above about 15% slope (less many sites) but could offer no explanation in terms of soil or physical factors. At any rate there is a fairly definite upper slope limit beyond which no burrows. Apparently little upslope travel in season when new burrows being dug. Possibly a relation

Cynomys ludovicianus

April 21, 1955 Weld & Larimer Cos., Colo.

to predators (steeper higher slope, easier capture?) - but next to Atriplex bushes & near boulders (at Farce colony). 15 snap traps set along fence near CPER colony took 2 Peromyscus maniculatus (several others sprung). Bait gone from 10 live traps & none sprung at 8 a.m., CPER.

April 22, 1955. Arrived CPER colony 10 a.m. Mapped until 1 p.m. Still no new green grass except in wettest parts & on certain slopes; even there must search to find it. I set 17 steel traps in area 11 mi. N. of Waverly, 12 on Sec. 23 colony & 2 near site, 2 mi. to SE, where a single one seen yesterday (where 1 of 2 shot earlier). Cloudiness increasing during day; rather warm. Strong wind evening.

April 23, 1955. Strong wind & clear skies. Visited Sec. 23 colony & took 3 specimens from 11 steel traps set. Two others were sprung. Left 6 set. ad. ♂ ~~(71)~~ (#68) One ♀ in trap had filled mouth of burrow in struggling (not opened Apr. 25, so only occupant). Trapped adult animals had fur scraped from nose & belly. But one taken Sec. 13, where apparently no neighbors, was in excellent pelage (♀66). This one same site as ♂ 46. Apparently had not been fertilized. No molt either (lacteal tissue initiated?). ♀69 ~~♀71~~ small (taken 50 yds. out ~~from~~ inside colony from peripheral burrows).

~~April 24, 1955~~ Pregnant ♀ (67) taken near S. edge colony, & ad. #68 too.

Larimer Co., Colo.

April 24, 1955 Visited colony on Guy Jordan place, Sec. 31, 5 mi. SW of Loveland. Saw at least 7 out. Many burrows showed had dirt dug out of mouths, but no mound building. Many diggings as for roots, but none obviously fresh. Droppings showed ~~that~~ burrows entering tops of tussocks used by C. l. I photoed burrows. No new burrows. One C. l. at SW of colony at

Cynomys ludovicianus

April 24, 1955 Larimer Co., Colo.

edge of 5" tall green grass (little or none where most activity, but Atriplex & Opuntia common there). Mr. Jordan intending to poison these C. l. with strychnine grain. // At Estes Park visited James Cole, Biologist of National Park Service. He said that in Wind Cave area he found colonies stopping short of ridge tops, apparently because of prairie beardgrass there. He also said they seemed not to invade Aristida. Now he was working on historical account of Missouri R. basin. He thought grazing heavy when buffalo present, & elk, & Indians with horses. Learned nothing new.

April 25, 1955. Visited Sec. 23, 11 mi. N. Waverly, & took ♀ 70 & ♂ 71 from steel traps. ♀ 70 small; much digging of roots near burrow; starting to molt. ♂ 71, large, no molt. It had dug & trapped itself tight in burrow mouth, packed in with ~~soit~~ soil on all sides, forelegs & head outside. // ~~Carex~~ Asm? green & 4½" long at low spots. Some green grass also in low spots but not on higher ground between drainage ways. Some dug roots probably Cogswellia of 1 kind or another, but much ~~[illegible]~~ untouched, especially the pubescent kind with swollen deep root. I collected many root remains. A yellow-flowered glabrous Cogswellia (?) common & not apparently eaten some. Pubescent are often still intact at side of a dug spot. Tops of pubescent Cogswellia sometimes cropped, & new ~~growth~~ growth continuing. No evidence seen of eating green grass. Onion tops & bulbs taken scarcely. Main forbs visible: the 2 Cogswellias & Allium. // At Sec. 10 I shot 2 (♀72, ♂73) in craters well inside colony. Compared to Sec. 23, pasture condition good. Atriplex 2-3' high; much Muehlenbergia. A few craters broken out on one side & apparently dug out by badgers. Some old mounds riddled with

Cynomys ludovicianus

April 25, 1955 NE Larmier Co., Colo.

small burrows as of Dipodomys or Citellus tridecemlineatus. //One steel trap on Sec. 23 took Speotyto. Shot a Lepus townsendi at mouth C. l. burrow thinking it a C. l. (♂, testes 35 mm. long). I think that some ~~craters~~ craters broken out at one side have been dug out by these hares. Several horned larks seen on colony in Sec. 10. One nest nearly finished (on ground in colony, 20± yds. from burrow). Visited Sec. 24, 5 mi. NE Waverly, which was poisoned 1953. I found no sign of prairie dogs in area. Burrows widely spaced. Good pasture condition & widely spaced burrows — is poisoning most effective where pasture condition good? Greener grass here than at Ackerman's on CPER. Nr. Ft. Collins, Colo.

April 26, 1955 Arrived Spring Canyon Dam colony 9 a.m. & saw 10 C. l. out. Saw green aspect with ~~burrows~~ mounds standing out because of contrast in color. Saw 1 at #36, 2 near #33, 2 near #10, 1 near #16, 2 near #17, 1 near #12, 1 at #3. So at least 10 left. No reoc. most areas where trapped. //At 10 a.m. visited Fossil Creek area, Sec. S 1/2 of 4. Shot one there (♂ 74) at edge planted field. Saw at least 8 on planted field slope (facing S) & atop slope. Some much tracked burrows in field were 100 yds. from unploughed ground. Planting here apparently before last rains - probably in March. Wheat(?) about 4" high. C. l. make shallow diggings mostly as if not after seed, but blades. A few new burrows about 8" deep on slope. Burrow spacing 20-30 yds. in parts this field. The 8 in area of about 5 A. Some fled 50 yds. out of field & to flat (uncultivated) below where many burrows. Another more recently planted grain field 300 yds. to S. also being used by C. l.. I took photos of burrows there earlier this ~~month~~ month. Green grass blades of barley ~~wheat~~

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April 26, 1955 Nr. Ft. Collins, Colo.

now about 4" tall. Some C. l. apparently went right down furrows, digging shallow pits. I saw 10 in this field at once - 5 were in an area of 1 A. At least 3 in another area 300 yds. W. of first. This field (N. facing slope) along base hill, gentle slope, & 50 to 100 yds. wide. Well developed mounds of C. l. out in field. 3 dogs 10 yds. downslope into field from upper edge (uncult. above & rockier & steeper - this uncult. area with burrows - some old mds. in ~~mounds~~ of field most at top of slope). I saw one gathering dry grass about 10' above edge of ploughed field. It then ran 50 yds. downslope into field & took grass into burrow. Out 1 min. later & went for more grass, same site. 3½ min. after leaving burrow, back again & in. Out 1½ min. later & again ran-walked to uncultivated ground. // When I first arrived this morning I heard many loud calls - somewhat like a group of geese in sound - & I saw a Buteo borealis flying low over colony. Perhaps calling in response to hawk. // I shot ♀ 75 about 80 yds. ~~100'~~ E. of road in W. half Sec. 3. Belly nearly all molted. A yellow-flowered Cogswellia (?) common here, & some Leucocrinum (sand lily) & 4" tall sparse grass. // A few new burrows to 10" deep near bottom, on 10% slope. Two burrows 4' apart seemed to have been recently dug out by badger. Mound demolished, crater broken up, & large rocks on surface. Scratchings on surface showed possible attempt to rebuild mound.

April 28, 1955 Nr. Ft. Collins, Colo.

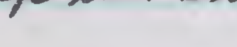
Clear but windy (30 mph). At 7:15 a.m. arrived Fossil Creek. Shot one to E. of road (Sec. 3) (no planted fields) & 2 to W. (Sec. 4) All these hiding in burrows, only heads showing, latter two chirping at me. At 7:45 a.m., 13 seen on S. slope at N. side colony in the planted field (older planting), & 2

600 150

10 2

Cynomys ludovicianus

April 28, 1955. Nr. Ft. Collins, Colo.

in more newly planted field on S side (N. aspect). Latter two apparently assoc. with same burrow in field. The 13 were in area of 2 acres only. They started to run when car 300 yds. distant, most running downhill out of field to flatter unploughed ground. Three out of sight of car fled at approach by car to 200 yds. Faint greenish aspect to this hillside. I took ~~photos of [illegible]~~ photo (35 mm. Ektachrome) of it. Apparently this slope on N. side of colony more used than opposite, tho ploughed longer ago & having shorter grain blades. // I set 5 steel traps near burrows in field on S. side colony, hoping to see what part grain eaten. Diggings only about an inch deep but sometimes as much as 4 feet along seed row dug up , rather methodically, in straight line. ~~One~~ Two burrows 10 + 20 yds. from edge field were on faint nearly straight paths leading to unploughed ground at edge. Many burrows in steeper unploughed area - these seemed to be C. l., judging by droppings, tho mound material all on one side & slopes estimated 20% (dig on steeper slopes near good food supply like grain? // In ~~area~~ valley 300 yds. W. of county dump (Sec. 33), I set 2 steel traps at 1 burrow where I saw 1 C. l. Saw another 100' from site. Apparently a few only here where many old burrows. Most used eastern burrow had other used burrows near - to 40 yds. E. of it, 40 yds. downslope, & 30 yds. upslope. In this area much dead Buchloe & Muhlenbergia, 6" tall green Allium, 6" ~~Carex~~ aster in low spots, some green Buchloe, two kinds ~~Lomatium~~ Cogswellia (? - one yellow flowered, glabrous; other white flowered, pubescent, much less common). // I returned to these traps 2:30 p.m. & found Speotyto in one. Released, it ran down the burrow, out of sight - into apparently occupied burrow. Set a third trap 50 yds. N W of the two. Then (3 p.m.) visited same colony as this morning.

Cynomys ludovicianus

April 28, 1955 Nr. Ft. Collins, Colo.

Brief visit to Spring Canyon Dam colony in forenoon. Saw 10 out: 1 near #24, 1 between #8 + 9, 1 nr. 16, 1 50' to W. of it, 2 near #11, 1 50 yds. S. of these, 1 nr. fence 50 yds. W. of #11, 1 nr. #19, 1 nr. #35.

April 29, 1955.

At 9 a.m. took 2 ♀♀ from traps in new wheat field in Fossil Creek, Sec. 4 (S. side of colony). These both small appearing + bellies molting. Left 7 steel traps set near burrows in field there. Mr. Stroh told me that area invaded after planting last (?) year. The wheatfield on N. side colony, where most C. l., planted last fall & "blowed out." No C. l. in field 2 years ago, Stroh said. He hoped that Mr. Grause, lessor, would have the C. l. poisoned. Stroh said sometimes tractor dropped into C. l. hole & broke a tire. At 9 a.m. at least 8 on the S. slope in fall-planted wheatfield at N. side colony. I saw burrows started along streambed (not sure C. l.) going in from naked bank & under sod layer. Saw one C. l. steep slope (20%?) to S. of S. wheatfield, at yellow earth mound (so ascend slope?). Many lines 4-5' long where ditches between ridges (3-4" high) have wheat growing. // At CPER, Weld Co., overcast & windy 11 a.m., so few out. One ~~px~~ 40 yds. E. of E. fence allowed me to approach to distance only 50' before dropping down burrow. ~~Sedge (Carex)~~ acam (= western wheatgrass) now growing green in some low spots, Bouteloua gracilis somewhat green, some apparent Muhlenbergia green, Cogswellia (pubescent kind, only one here) with heads, Leucocrinum common but not flowering yet. Many new leaves on closely cropped shrubs. I saw 2 Staphylinid beetles 3/4" long walking ~~over~~ on ground away from burrows. Took one Phrynosoma on colony. Some well drained sections have almost no greenery in grass. Some nearly cleared

9 7
9/
1/ 8
/38

Cynomys ludovicianus

April 29, 1955 CPER, Weld Co., Colo.

out burrows, 2 being next to fence posts in N. center of colony. Another on S. edge of eastern exclosure. Another 50±' east of former easternmost burrow - now 8'E. of stake ~~2±E, 26±S~~ 4cE 24cS. (see map). At least 1 new burrow about 1 ft. deep only. Diggings for roots fairly numerous certain sites but not fresh - abandon when greenery increases? Completed staking at 2 chain intervals for map. Max. measurements 34 chains E & W, 28 chains N & S. Center corner of SW 1/4 Sec. 22 will be 00. Stakes to E W. for 32 chains, to E. for 4 chains, to N. one chain, to S. 26 chains. Total area inside stakes about 39 A. // At about 10 a.m. released marked ♀ at Wellington colony (see p. 89, notes). This kept in captivity since Apr. 13. It ~~lost wt. (over 100 gms.)~~ lost over 100gms in captivity & vulva bld. Fed mainly on dog food pellets plus greens. Ate celery, cabbage, apple cores, etc. well. I think could not survive on dry food alone. Rather wild & stayed in nest box most of time. I marked it black on R side back & released it near burrow # 3. It ran 30' to burrow, wagged tail vigorously, & entered quickly.

April 30, 1955 Nr. Ft. Collins, Colo.

Shot 2 ♂♂ near Ft. Collins, Sec. 3 & Sec. 4, 6 mi. S, 2 mi. W. of town. Sec. 4 ♂ taken in wheat field at mouth burrow. Sec. 3 ♂ in horse pasture on opposite (E.) side road.

May 1, 1955. ♂ 83 trapped in wheat field, Sec. 4. This largest ~~C. L.~~ C. l. yet taken, I believe. Two burrows where ♀ 79 & ♀ 80 taken in wheat field show no more use - no other occupants? (These females were small.) Burrows in wheat field may be those of recent invaders. What age classes occupy? //. Dump

May 2, 1955. About 8 a.m. visited groups in canyon just W. of county dump, 2 mi. W. & ~~5~~ 5 S of Ft. Collins. I saw

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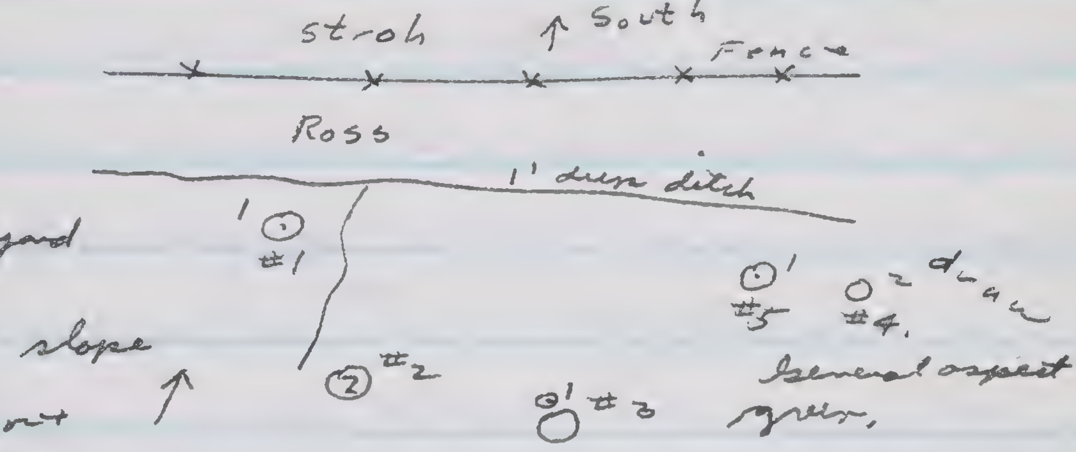
~~Ar~~ May 2, 1955 Nr. Ft. Collins, Colorado.

6 out in area 300 yds. long by 100 yds. wide. Two burrows had 2. I set traps at 4 burrows where seen (took up former 3 traps). These located:



used burrows to 75± yds. beyond both ends where dogs seen. Two out used below (S. of) ditch m #1. Traps set at #1 to #4. This a thin population that has survived or reinvaded area. Many unused burrows too. ~~Carex~~ Aster, Muhlenbergia, Buchloe, Leucocrinum, Cogswellia (pubesc. & smooth kind (yellow flower)), Allium, present. No shrubs. Much old digging for roots but none new. Top of one old mound without burrow has new 6" deep hole dug in it. One broken crater has scratchings in soil to distance 4' around as if to repair mound. // Saw 1 Circus low over Spring Canyon Dam colony, a few ft. above ground, as if hunting (this on May 1, 10 a.m.). // Drove to Sec. 10, Rudy Ackermans, 10± mi. N. Waverly, & set 14 steel traps at used-looking burrows. ~~At~~ One in 2' tall Atriplex area, some in 4±" high browsed Atriplex, others where Buchloe & Muhlenbergia principal plants. Mod. heavily grazed here, but grass sometimes covered 60% of ground surface. Most traps set on slopes < 5%. On a flat area (about 2% slope) in bottom where much Buchloe, small diam. C. l. burrows with mound on one side only. Apparently these are old ones being opened up. Probably high water table here some seasons so ~~burrows~~ mounds not large (not long continued occupancy?). Many had rather large chambers in mounds or craters broken up &

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May 2, 1955 NE Larimer Co., Colo.

8-10" diam. hole, as if badger dug. But a *Lepus townsendi* carcass has lain nearby for a week without being taken by carnivore. I found old remains (skin) of 2 *C. l.* // Picked up coyote (?) scats at 3 sites. Not very fresh. Apparently *C. l.* craters (cones) are favorite posts for depositing droppings. Several burrows in or next to *Pogonomyrmex* mounds (now ants inactive). Dig for seeds? — or in soft ground, or in dampness under rockpile? One apparently new burrow went under *Atriplex* base & under 10" boulder on ground (to 6" deep). Much old digging for roots, but *none* new seen. Present was small yellow pansy in bloom (somewhat larger near Ft. Collins), the pubescent *Cogswellia*, & much *Muhlenbergia* & *Buchloe*. These last two had many green leaves now, but genly about 1" tall only. No cattle yet on this pasture this year. // At 5:30 p.m. checked 4 traps near Ft. C. dumps — no sign of tracks on close to them. In general, few taken in traps same day put out — stay in after scare or use other exit? Strong wind & blowing dust, & overcast, in afternoon.

May 3, 1955 Nr. Ft. Collins, Colo.

Many flies & beetles seen at mouths burrows in all areas. These may be food for mice, *Citellus 13-lineatus*, lizards. // Lost one trap set nr co. dumps. Another held a *Sylvilagus*. Left 2 set. Partly overcast & strong wind today. // From 2-3 p.m. I visited traps in Sec. 10, 9 mi. N. Waverly. Caught 11 *C. l.* in steel traps (only 14 set). Good catch because high proportion burrows occupied?

Dump

May 4, 1955. At colony near county dumps (4 S., 2 W. ~~2 E.~~ Ft. C.), at 9 a.m., I saw 8 out, ~~total area~~ all in N.W. part of occupied area & farther out than previously thought. Whole occup

Cynomys ludovicianus

May 4, 1955 Larimer Co., Colo.

ied part about 400 yds long, 100 to 150 broad. None in my 4 traps, tho one sprung. I took these up & set 6 at burrows where one seen today (2 seen at mouth one crater). Saw one C. 13-lineatus on a Cynomys mound at edge colony. // Then visited Sec. 10 colony, 9 mi. N. Waverly, & took up 14 traps. These held ♂ 99 (same trap as yesterday). Three other traps sprung (set same as day before). I shot ♂ 98 + ♀ 97, approaching to about 70 yds. range, & missed 3 others at 70-100 yds. Some large mds had on surface several small burrows as of Dipodomys ordii. Saw no Citellus or Speotyto in area. Saw a Sylvilagus in mouth one burrow - it went down it. Rabbit fur around edge. Apparently badger-dug hole without C. l. Many mouse tracks mouths some C. l. burrows. At least 15 apparently badger-dug burrows found in my rounds. Perhaps dug last fall. Many burrows had ~~[illegible]~~ spider webs across mouths. Several burr. in or next to ant mds, angling under. One like this had active Pogonomyrmex colony in mound. General cover of area Buchloe dactyloides (flat areas especially), Muhlenbergia (major some slopes), Bouteloua gracilis, Atriplex canescens (heavily browsed most sites so not over 3" high). Few forbs - yellow pansy & Cogswellia present but rare.

May 5, 1955. At colony near county dump, 6 traps held ♂ 100 & a Speotyto (set at burrow where a C. l. seen). ♂ 100 screeched & scowled especially much in trap. Taken at W. edge of N. end colony. Set traps 25 yds. N. + 25 yds. E. of burrow where ♂ 100 taken. Left 6 set in all. No tracks where ♂ 96 was taken. // At CPER colony, many out. Several feeding on bottom in center colony. One high on slope at S. edge above peripheral burrow (near 12 W,

Koford

~~30~~
105

Cynomys ludovicianus

May 5, 1955. NW Weld Co., Colo.

~~ens, tho heavily grazed so inconspicuous over most of area, + few small forbs. Apparent Carex, green, damper slopes (not out on flat).~~

105). Water in ponds surrounded by mud showed no C. l. tracks. A vetch, yellow pansy, Leucocrinum, in flower. One burrow at base of fencepost of N. fence opened, + others in area. Several burrows on flat bottom (no mounds or in bottom of 6" sunken spots) had been opened + cleaned out, much old excrement scratched out. Probably high water table at some season keeps high mounds from forming. Some burrows under Pogonomyrmex mounds. Green aspect to colony now.

May 6, 1955 Nr. Ft. Collins, Colo.

Visited with Ronald Smith, grad student of Boulder, Wellington colony + 2 in Fossil Creek area. At dump colony (SE 1/4 Sec. 33) took ♂102 in trap. Apparently it got in yesterday, for fly blown around face. It was nearly dead. About an hour later it could squirm about, + heart beat 80/minute, but body temp. 70°F. I left it in cold (near freezing) room + it was dead by 4 p.m. Another of 6 traps held a Sylvilagus ♂ (dead, head gone), testes about 30 mm. long. Reset traps same sites. // At wheatfield in Sec. 4, shot ♂103. It ran 30± yds. to burrow near upper edge field + shot there. Still many diggings of wheat rows here. Idea - burrows here on 40 yds. wide strip at S. edge wheat field ~~so~~ are on especially steep slopes for this area. There is invaded wheat field above unploughed strip. So, ~~do~~ does food above cause or allow C. l. to use these steeper slopes? - not limited by physical facts? Ron Smith told me of colony in Left Hand Canyon about 15 miles from Boulder. He said C. l. in rather steep + rocky slope.

Cynomys ludovicianus

May 6, 1955 Nr. Ft. Collins, Colo.

at first he thought possibly *C. leucurus*. // With Dr. Wasser of Range Mgt. dept, Colo. A+M, visited Spring Canyon Dam colony. ~~Besides the~~ Plants: *Coquwellia* (= *Lanatium orientale* in Harrington) common, & now *Sphaeralcea* too prominent (1" high). Sprinkling of *Agropyron smithii*. Wasser rated pasture only fair because of small proportion of mid-grasses. Ungrazed, he thought it would look like that across road to W., where some apparent remains old mounds. Much *Salsola pestifer* growing here now, about an inch high. // At dump colony, SE 1/4 same section (33), much *Muhlenbergia torreyi*, with patches pure *Buchloe dactyloides*. Poverty weed (*Iva axillaris*) common on barer spots (indicator poor ~~&~~ condition). *Vicia americana*, *Notholaena cuspidata*, *Aristida longiseta*, present. Very prominent is yellow-flowered *Musenium divaricatum*, less of *Lanatium orientale*. Again pasture condition only fair. Little *Agropyron* here. *Iva* & *Sphaeralcea* on mounds. // At Sec. 3 colony, heavy grazing so grass short, but patches pure *Buchloe*, smaller patches *Bouteloua gracilis*, & much apparent *Agrop. smithii*. Where latter grew, much cutting & packing of soil by wind action - little where *Buchloe*. Near bottom was *Distichlis stricta*, & new *Kochia scoparia*.

May 7, 1955. Traps in SE 1/4 Sec. 33 Dump held 0. Took up 3 + reset 2 (farther to N.). No activity apparent around burrows at S. end, tho none taken there (1 possible as traps gone). Perhaps disturbance at burrows causes abandonment, perhaps especially by males or immatures.

May 8, 1955. In same traps took ♀104, first ♀ taken this colony. Small but parous + molt advanced. Changed location; traps (a still

Cynomys *ludovicianus*

May 8, 1955 Nr. Ft. Collins, Colo.

set). No tracks at any burrow where 1 taken (or owl or rabbit). In examining spec. from Ackerman's Sec. 10, noted ♂♂ all about same in molt + testes size, tho taken over distance of a few hundred yards where vegetation varied some. This indicate sample from a colony not have to be from one small part? Apparently molt starts at corner mouth, around eye, + betw. eye + ear, proceeds backward on belly, then back on dorsal surface to sacral area + thigh. Tail + sacral area last or omitted? Some ♂♂ had whitish hairs near genitals, as if recent molt there. Sexes molt same time? or do ♂♂ lag behind ♀♀?

May 9, 1955. At colony near dump, I took a ♂ + ♀ in traps (6). These near N. end of colony in burrows 50 yds. apart. Burrows to 100 yds. farther N. showed sign of *C. l.* use this spring. Occupied burrows on slopes to about 50%, facing SW, though old burrows on steeper slopes + on opposite slope. // At Sec. 3 horse pasture, I shot an adult ♂ + saw 10± others. Most concentrated on N. slope of 5±% between dry water reservoir + an irrigation ditch in area of about 2 acres (at least 5 in one acre at one time). // In Sec. 4 saw two in wheat field on S. side, where some trapped. I shot a ♂ + a ♀ adult on flatter bottom, unploughed, 30± yds. from the edge of wheat field. Fair amount *Agropyron* *smithii* there, + yellow violets, *Chrysothamnus*. // Wasser told me that *Buchloe* + *Bout. grac.* increase production when clipped. Thus, clipping all plants by rodents might increase total production + net of left for cattle by *C. l.* as much as otherwise.

May 10, 1955 Traps held 0 + not sprung. Took all up. Ground

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May 10, 1955. Nr. Ft. Collins, Colo.

packed by light rain of yesterday. Saw 1 at burrow where a ♂ had been trapped, but saw no others out at 9:30 a.m. Much *Salsola* about 1" high gives green aspect. Yesterday flushed a *Lepus californicus* here. 1/10 cumulus; 20 mph wind. // At Sec. 3 I shot an ad. ♀ & missed others shot at. One ran thru mod. growth of 5" tall *Distichlis* & across 2' deep 4' wide ditch to burrow. One mound, evidently bored out by badger, now had scratchings to 6' distance as if *C. l.* trying to repair it. Green *Salsola* to 1" high common on some mounds; *Iva axillaris* on others. One had large *Astragalus bisulcatus* growing at entrance & somewhat overhanging hole. Slight breakage of parts next to hole, but plant not ~~eaten~~ eaten to any notable extent. Cut blades of *Agropyron smithii* where one seen feeding. Do not feed in greenest looking spots, however. Hillslopes above burrows generally greener than lower slopes. No tracks found in mud in bottoms. One burrow went down 10±" & horizontally at least 5', about 8" below surface. Notable too that burrows not in low spots where grass greenest & tallest (due ground water?). I found a few fresh diggings with cuttings leaves *Lomatium orientale* & violets there. Much yellow violet growing on bare ground. *Opuntia* starting to flower. Two mounds without burrows showed fresh diggings at crest. This colony extends to near next road to E., about a mile in length, along Fossil Creek. // At 2 p.m. visited *Wellington* horse pasture colony. I counted 14 (at least) in half an hour. Also saw two *Citellus 13-lineatus* & 7 *Speotyto* in the mapped area. Much feeding in the thick *Distichlis*, now mostly green. At one time 5 at once in space 80 yds. long, 3/4 A in extent, in

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May 10, 1955. Larimer Co., Colo.

~~Dsto~~ Dist. str. just E. ~~W.~~ of Typha (see map). 0 of the 14, one seen in ~~G H~~ HE, (W. 1/2), one in field in ~~Att~~ NE 1/4 of HE. This one went across fence to graze in green Distichlis. At least 3 also grazed in green Distichlis in eastern 1/2 of mapped area. One in N center of EE was adult ♀, nipples protruding, chest molted. Speotyto moves about considerably but #2 burrows had two at once (#6 + one E center GD seen used before). Made overlay map of those seen out 3:45 p.m. At 4:10 I shot adult ♀ (111) by burrow #8 as it fed among Kochia scoparia (green + dry) on last year's grain field. // Perusal area showed much Distichlis green, 2-3" long, + much Iva axillaris, some Agropyron smithii, Juncus (?), & some other forbs. Those feeding in Distichlis hidden in grass in side view. Not very thick growth, however. // Twice I saw a ♂ marsh hawk fly low (15-20' high) over prairie dogs. They stopped feeding & ~~some~~ some ran a short distance, but resumed feeding quickly after hawk passed. Saw 1 Lepus californicus on this colony area

May 11, 1955 Arrived at Wellington horse pasture colony 10 a.m. Clear, wind 25 mph. I saw max. of 12 at once on colony of 4 acres. Saw 1 Citellus 13-lineatus, several Speotyto, a few meadow larks, 2 magpies, on ground in area. At one time 5 C. l. in Distichlis ~~in GA~~ in area east of Typha. There feeding apparently. I saw one in Kochia + stubble 20 yds. S. of fenced area. It ran finally to burrow at fence line (on S line of ED). Same (?) then ran on into Distichlis in NW 1/4 of FC. Another from NE of it ran 20 yards toward intruder as if to defend. Both actually in edge of Typha where dry cattails 1 1/2' high but in open stand, soil damp + crusted with salts. ~~Not all fe~~ Another fed in Kochia + Salsola 30 yds.

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May 11, 1955 Nr. Wellington, Colorado.

S. of N6 post. An old burrow there but showed only occasional recent use. ~~Att~~ Two fed much near S4 stake where some new Kochia grew, + 3 in Distichlis (also Iva, + new Asclepias shoots) in E. end of colony. Spiderwebs over burrow in S. center of HE, where I had set steel trap. Trap at burrow HE 1 sprung. I do not believe burrows in stubble field continuously used. About 80 yds. to S. of ~~post~~ at N2 (S fence), two burrows apparently badger dug (for other rodents?) within recent months. No C.l. sign near there. // On colony one large diam. burrow (10") had 2 lines scratchings outside as if attempt at repair (these often assoc. with large holes). Mound 20's of #4 now has small burrow (none when map first made). A new appearing burrow 11 yds. E. of stake S6, where little bare ground but much Iva, Distichlis, + Kochia. // At 11 a.m., saw 7 C.l. on field. One fed long at edge Distichlis where joins Kochia in E. part of FC. Another from 60 yds. E. ran to it, they touched noses, then grazed together in vicinity, a few feet apart (11:20). One finally left + I shot the other (♀ 112), an ~~doe~~ adult, at 11:30 a.m. // No sign of dyed ind. I released at DB3. // Autopsy: impossible to tell success of reproduction by embryos or scars. It is survival young that is of importance. Ratio juvs. to ad. ♀ ♀ perhaps best indicator. Should get this in summer or fall. Burrow AD1 is farthest east that now is used. // Five burrows probably will have Speotyto nests as they now contain much dung + insect scraps. These are mapped. The owls visit many other mounds, probably to catch insects there. See Speotyto notes.

May 12, 1955. Gurney Crawford told me ~~that~~ in Wellington preserve he saw today a group of about 6 young prairie dogs out; These

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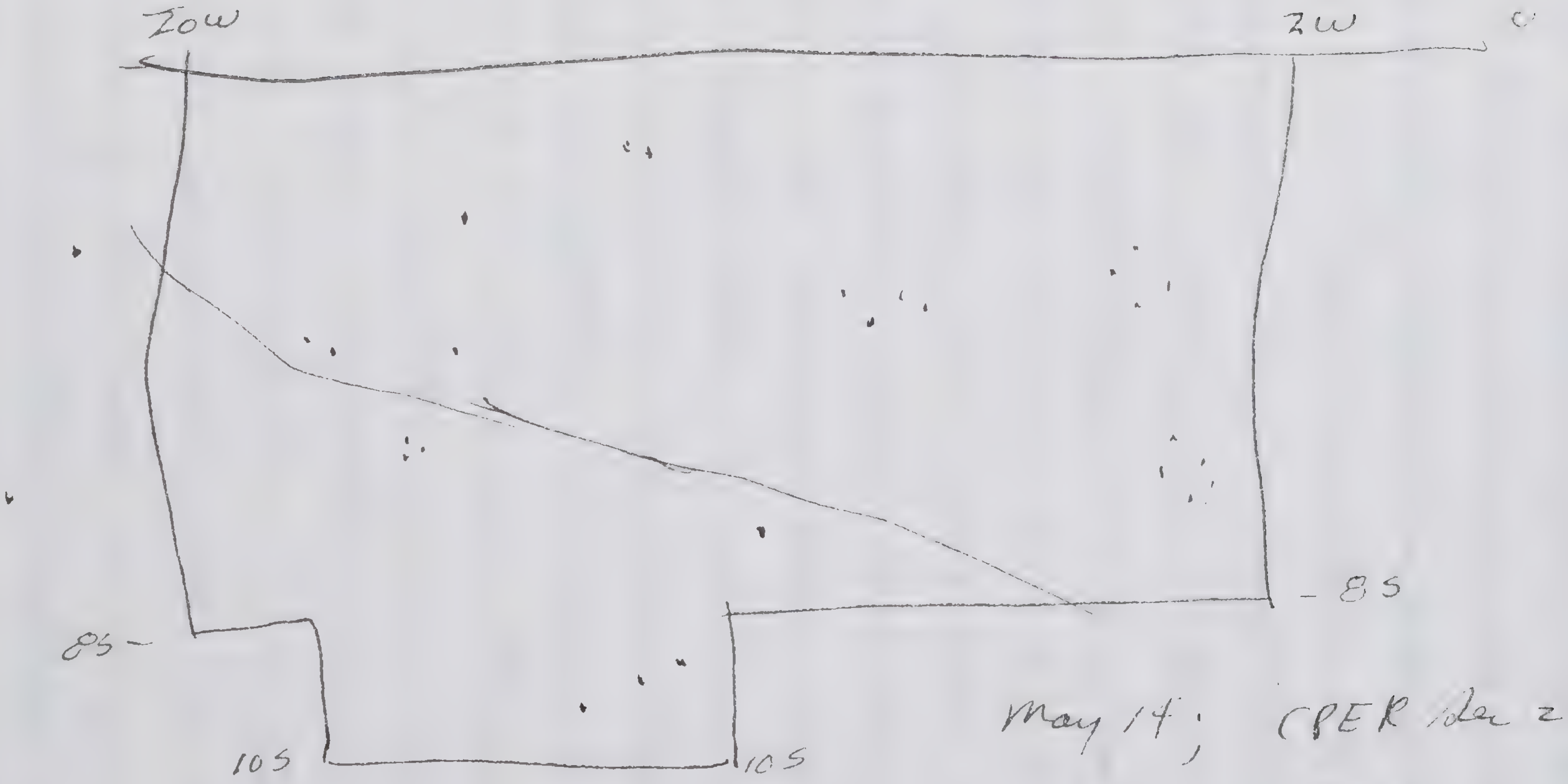
May 12, 1955. Wellington, Larimer Co., Colo.

about "rat-sized." None seen 3 days ago. These animals fed much barley all winter. Breeding was apparently earlier here where much food than elsewhere. Also I note that a small ♀ taken here, doubtless a yearling, was pregnant. Good winter food = early breeding + high proportion yearling ♀♀ breeding?

May 13, 1955 Visited Wellington colony + saw 4 small young out at one burrow near "Charlie," as Crawford told me. Searched area but found no other young out. Two Speotyto in the acre near Charlie. Perhaps 15 C. l. /acre here, where fed, or even more. What will happen when young added? Saw 2 large hawks (Buteo ferrug., prob.) over area. A marsh hawk chased one of them off. Perhaps these sometimes take C. l. - especially young? Saw 3 Citellus 13-lineatus in preserve area. Very little Salsola in preserve. Due C. l.? But much Kochia (alkali tolerant). Several ant mounds present but not molested by C. l. Muehlenbergia torr. in large patches + apparently not held back by C. l. Little green grass present. Scratchings around some mounds as if to build higher. Sky 8/10 overcast. Warm breeze. Left 10:30 a.m. Drove to: CPER, Weld Co., Colo.

Looked over Sec. 22 colony. About 25 C. l. present, or more. Saw no juveniles. But 33' E. of stake 20W6S (red-pink) saw Crotalus at mouth of small burrow on flat ground. It was in sunshine. Fairly large. It crawled back into burrow when molested. A rather tame C. l. in burrow 25 yds. distant. First Crotalus I have seen in C. l. town. // I shot an adult male on N. slope in E. part of colony, at crater 50' S. of 6W16S. stake. Testes abd.


20W
2W
0
85
85
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10S

May 14; CPER site 22

↑ N 8-9 a.m.

25 seen

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May 13, 1955 CPER, Weld Co., Colo.

but scrotal area black & baggy. Scratchings around crater as if to build up. Soil very dry. No water on colony. About 10 yds. from this crater were 2 new burrows, 8" + 14" deep, 4' apart. One under old Chrysothamnus bush; one in Muhlenbergia patch. 20 yds. from first site, another new burrow in Muhly, next to old Chrysothamnus stub + Opuntia. At least 20 fresh appearing mounds, possibly new or newly opened, with all fresh soil in mounds. Some near-white with rocks to ± 3/4" diam. Most of these on slopes of about 5%. One under Opuntia clump. §§ Upon arrival today, at least 8 seen on flat area of bottom in center of colony where much ~~Buchloe~~ Bgr & some greenery. In general C. l. here very shy. Only 2 allowed approach to within 80 yds. (shot 1). Fair amount of Sphaeralcea about 2" high. Others have found this much eaten by C. l. A slim grass about 4" high scattered widely at some sites; shallow roots. An Astragalus in flower (white), & a 4" high forb in white flower. (Samples saved). Near dry pond in bottom, green Salsola starting, Iva 4" high, & Agropyron (?) 6" high. // Put in stakes & marked them. No fresh carnivore droppings found, or badger digging. No hawks or eagles seen. // Set 13 live traps baited with whole barley, rolled oats, & carrot.

May 14, 1955. Arrived Sec. 22 colony 7:50 a.m. & watched until about 9:30. None in traps or apparently interested in them. In a 15.6 A part of colony, I plotted approx. positions of prairie dogs seen, 25 in that area. At least ~~8~~ 9 more known in colony. Kept sketch of censused area. Two in quadrat A'0 at ~~West~~ W end colony. East of E. fence saw 2 about 20 yds. E. of 18.5. mark, & two about

Koford 113

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May 14, 1955.   CPER, Weld Co., Colo.

30 + 50 yds. ~~E.~~ of 22 S. mark. There is opened up burrow at S. edge of E. cattle enclosure (seen ~~last~~ visit 2 wks. ago too). Many apparently new burrows, or enlarged, with mound only on one side of hole & in small quantity. Ground dry & hard. Three seen together in cluster on flat bottom as if sunning on bellys in bare earth. // At E. end, a new burrow 40' SE of 4E 24S. stake. At W. end, 1 new ~~2 new~~ in area 2 chains W. of 28W. 2N. Feeding in gen'l on slopes gray with Muhlenbergia, not in greenest areas of bottom. No eagles or hawks seen. Saw 1 Citellus 13-lineatus near 32 W. mark (not in C. l. colony). No burrowing owls seen this colony. Carnivore droppings common but all old. // I visited Ocor ranch ½ mile N. of Rockport where grazing by buffalo extreme. Many C. l. here tho poisoned with strychnine grain every year. Mr. Ocor said long ago poisoned & cleaned out. Then about 1938 one burrow started. He had never seen ferret here tho he knew what they looked like. He has lived this place since 1908. He likes to have a few C. l. around as tourist attraction. Dislikes strychnine because of agonizing death. I shot a ♂ for examination.

May 16, 1955 At Ocor ranch near Rockport, Weld Co., Colo. shot a ♂ & ♀. Many C. l. here & comparatively tame. Many allow approach to 50 yards. Saw 1 Sylvilagus here.

May 17, 1955.   Nr. Ft. Collins, Colo.

At 10 a.m. visited colony near dump. I saw 4 C. l. Three at one burrow about ~~70~~ 75 yds. short of SE extremity, & one about same distance short of NW extremity. These may be all ~~that~~ remain. Groups 300± yds. apart. No young, seen, seen. Visited Sec. 4 colony 1 mile S. of dump. Saw 2 at one burrow in wheat field on S. side bottom. Wheat still

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May 17, 1955 Nr. Ft. Collins, Colo.

short, 4-6", + uneven. Few on unploughed flat area, but many forbs as well as grasses now growing there. Shot a ♂ for exam. // At Spring Canyon Dam colony at 11 a.m., I counted 8 or 9. One near ~~# 9 + 10~~ # 9, two near fence 50 yds. to W., + 2 more farther W. in area N. of fence. None in ~~S~~NW 1/4 of colony where trapped out. To S. of fence, I saw 3 or 4 more, two being together in bottom at E. side colony (m. # 25), + one or two farther to W. This may be nearly all that survive. No young seen. All on slopes 1° to 3%. All well within area trapped earlier this year. No juvs. seen. // At Wellington preserve I set up 8'X8' wire mesh exclosure on ground where many C. l., + main vegetation Muhlenbergia torreyi + ~~Eriogonum wrightii~~ ? ~~Eurotia lanata (?)~~ (about 3" high as if much used). In general, ~~along~~ Atriplex canescens much more heavily used + less conspicuous than Chrysothamnus. Beyond C. l. to N. these shrubs 3'-4' high, + intervening ground has large forbs (Kochia ~~or a Chenopodium~~). I took ~~two~~ 3 photographs of exclosure plot. No other juveniles seen on preserve area. Opuntia budding here. Some buds eaten off, presumably by C. l. Saw one cottontail at mouth burrow + a C. 13-lineatus enter another one.

Albany Co.?, SE Wyoming.

May 18, 1955 Driving from Cheyenne NNE toward Torrington, for 20± miles went thru rolling green (greener than Weld Co.) short grass range, mostly run by Warren Live Stock Co. Old mounds in soil here on hillsides + flats. These could be ~~to~~ C. l. mounds long abandoned. Grassed over but barer on mound than on surrounding ground.

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May 18, 1955 Wind Cave Nat'l Park, S. Dak.

Talked with James Cole, Biologist, NPS, about prairie dogs here. He said now few in Shirt-tail Canyon at site where King studied, & little grass. He said he saw 1 young out. At Norbeck town, he said also few dogs, & grass coming back in town. He told me that once at Theodore Roosevelt park he saw a badger & a coyote hunting prairie dogs together, as if to guard 2 holes of a burrow. He is not at all sure that bison & antelope favor C. l. towns because of food (or ?) there, as ~~town~~ King has suggested.

May 19, 1955 Visited several prairie dog towns in park with Cole. At Shirttail colony, found old marker put out by King. Area he studied stood out as bare ground among surrounding greenery, & there seemed to be only about 2 dogs/A there. Cole said that in 1947 there were none on area where King worked. Cole had also thought there would be no expansion upslope to W., where much Aristida, but such expansion had occurred. Cole corroborated that oldest part town at W. end, upstream. We saw 8± Antilocapra on welldenuded section of the town. One abandoned burrow had conspicuous growth of Bromus on & 5±' around mound. A slope to N. of stream had burrows on rather steep ground; inhabited looking holes to 22% slope, & older, not recently used, to 31%. One packed inside by nose recently (due rain?). Many showed evidence scratching earth toward burrow as if to build up mound. Very pronounced abundance forbs on heavily used part of colony. A go fair stand grass on part of bottom where Cole said once almost bare of grass, on a rather old part of colony. // At Norbeck Dam colony, almost no dogs & good stand of grass for 100 yards beyond the display sign, where ground is flattest. Out here I saw

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May 19, 1955 Wind Cave Nat'l Park, S. Dakota.

one group of 5 young, however. ~~Many~~ High population density along foot of surrounding steeper slopes. At S. side, dogs had crossed over a rounded crest & were working strongly on an upper slope. I think that steeper slopes like this (15± %) would not be sites of start of colony, but are used in process invading new areas slowly by gradual modification of environment. Prairie dogs have high capacity for local modification of environment. Cole said none atop or S. of this ridge in 1947. This is first year he has seen grass on lower part colony near display sign at road. // Predators - greatest activity may be in summer when many young predators & many young C. l. This less effective than winter predation that prevents breeding, but cutting down of young probably prevents population pressures that would cause spread. // ~~the~~ No water in Norbeck Dam last 2 years. Thus, few buffalo use area now + less damage to vegetation. Buffalo apparently stay near water + graze heavily near it, little away from it (Cole). // S. Sanctuary town is at edge of area that was formerly game sanctuary. Cattle taken out only a few years ago. Cattle had used land heavily. ~~Custer St~~ Appearance is bare soil evenly dotted with C. l. mounds. Some C. l. very tame + allow approach afoot to 50'; in car to 10 ft. Much short Artemisia frigida on ground here where C. l. active. // Sylvan town of interest as separated from all others in head of narrow strip of grass between pines. There about 1/4 bare ground in main portion. Low density dogs. Some burrows 200 yds. up draw toward grassy meadow, evidently suitable for C. l., but these show no sign recent use. Most of burrows on steeper slopes (10 %) show no recent use. Elk + bison dung + tracks here. Some buffalo rolling spots, with hair.

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May 19, 1955 Wind Cave Nat'l Park, S. Dak.
Several burrows apparently filled in by C. l. One mound covered with old C. l. dung apparently dug out of burrow. Much 2" high Artemisia frigida & high proportion forbs/grass. // On Central town, about 20 bison, some with calves, & wallows containing water. Thin but scattered C. l. population, < 1/A ave., but this area has been poisoned. Town No. 3 (map, NPS) had fair no. dogs, tho once nearly all gone. Much Buchloe in lawn-like dense low stand here, & burrows widely spaced, no areas denuded. Slopes low. // In gen'l, areas where C. l. & apparently suitable are bottoms where color now blue-green with Agropyron. This area stops abruptly where slopes steeper & rockier, where Andropogon scoparius dominant, especially as much old & dry is standing. Line of start of Androp. is fairly sharp. Fair stands Aristida some sites, especially in lowest part of Central town where buffalo wallows present. Antelope also seen on Central town. Devil's Tower, Wyoming

May 20, 1955 Talked with custodian MacIntyre concerning the prairie dog town here next to Belle Fourche River. He said this protected from grazing for about 15 years (cattle before). Young about due to appear now. Dogs especially fat last fall. Winter activity little - none noticed out for about 2 months, tho an open winter. Badgers had been noted to be active in the town some winters (not last). Coyotes sometimes seen & increasing. Local ranchers protect them (cattle ranches). Mr. Dickinson of SCS, Hulett, could probably help in range survey here. ~~Good rains & grass seasons of 1953, 1954,~~ dry years. Weather records taken & available in Climatological Data. The dog town on gentle slope between river & hills ascend-

* Superintendent McIntyre says that he saw one C. l. on road near headquarters, about 1 mile from dog town (last summer?).

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May 20, 1955 Devil's Tower, Wyo.

ing to the tower. Restricted by river, rocky slopes, so has changed little in size, except shift to N. & some abandonment to S. No control here. Hawks + eagles said to sometimes take C. l. here. C. l. next to road on both sides & much traffic, so many killed by cars. // In the town ~~mounds~~ mounds small & widely spaced. Dogs very tame & came toward people as if to be fed, to distance about 5 ft. Much feeding of C. l. near road by tourists. In flattest part town, near river, much Aristida grass. One had burrow under edge of asphalt road in parking area. No juveniles seen. Fair cover of short grass & forbs (much Sphaeralcea). Can observe feeding on these at close range where dogs tame near road.* // We drove on to Theodore Roosevelt Nat'l Memorial Park (S. unit) near Medora, N. Dakota. Chester Brooks, historian there, especially interested in C. l. Some towns had been losing C. l. until few left, for reasons unknown. At one colony a display sign was to be installed, but C. l. in area disappeared. Some other colonies doing well. // Last winter mild. In 1954 dry until fall, then rains & green. Grass especially good 1953 due summer rains.

May 21, 1955 Nr. Medora, S. Dak. Dog towns here surveyed by Cole years ago. Generally in same places now. We visited eagle nest near top of mud bluff on E. side of Little Missouri River. Flushed adult & saw eaglet (some black feathers now thru white down) in nest. Posterior half of a C. l. in nest. The men said a C. l. seen in the nest a week ago too. One town 1/2 mile to N. of nest + another 1/4 mile S., both clearly visible. Both towns thriving. Beef Corral town on a wide green flat of gentle slope between road & river. Few Silver sage 3' high in zone around, + some a few inches high on town. This appears to ~~indicate~~ indicate elimination of this sage

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May 21, 1955 Medora, N. Dakota

by C. l. Slope very slight; almost flat. Probably sometime will be flooded. Soil all a gray clay with little rock. Much Sphaeralcea & yellow mat. On upper slope, on 10% slope, much Artemisia frigida a few inches high, + silver sage shoots ~~stem~~ to 5" high. Cactus present but not eaten. Fair amount Bouteloua. Phlox ~~closely~~ low + stubbly. No decrease population noted here. Some cattle & horses graze here, but few. Part of this colony has extended over low part of ridge to E. // ~~On~~ In Paddock ~~Lawson~~ Creek canyon, near foot, ~~Holiday Ranch road~~, a 30± A colony on gentle S. slope where almost no dogs left. Active (very) last year. Much Artemisia frigida a few inches high, + Agropyron smithii, + bindweed (?) on barer areas. Some badger diggings. Little Bouteloua. A few survivors ~~seen~~ ~~on~~ at head of slope on W. side. / another dead town Paddock Creek. Artemisia frigida had fruiting stalks to 12" above ground (not present active town). Much Agropyron, little grama. Black widow spiders in mouths of many burrows. ~~Some~~ Cactus patches show little feeding. Bottoms have cottonwoods, choke cherry, juniper, that would seem good cover for Lynx. All men said bobcats had been seen to catch C. l. here & that there were many. Coyotes had been seen on towns in winter, + seen carrying dead C. l. Only one colony on a definite N-facing slope (Hd. Paddock Creek). // About ½ mile S. of headquarters, a town abandoned winter '53-'54. Very few dogs. < 1/Acre. Part flooded out in 1947. This is an arm of Lawson Creek town. // Main Lawson Creek town is site of range transects put in in 1952 by Loren Potter ~~& students~~. 4 10 meter lines in town, 4 to E. in area where dogs might invade. ~~Almost no~~ No dogs seen here. In uninvaded area much ~~most~~ Agropyron & Bouteloua, few forbs. Essentially no C. l. here. (In afternoon stud-

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May 21, 1955 Medora, N. Dakota

ents of Potter's own transects in this town, now a ghost town). // Visited the Johnson Plateau colony. This one thriving last summer. A formerly ploughed area at edge colony had had many dogs & had been poisoned in 1953; the poisoning had had almost no effect, but had apparently killed some dogs. For reasons unknown, now few dogs. Old ploughed area had been reseeded this year (spring). On areas of hillside where no dogs now, large areas of a brown forb about 5" high (Erigeron canadensis). Many badger diggings here. Cactus patches few, but apparently not eaten. Agropyron, Bouteloua, & Carex present. // Transects: These first run last year. Method is a 10 meter ~~lo~~ belt 1 cm. wide. Species in each cm. counted 1, except single stalks that are counted 1/2. Foliage cover from above taken, not root crown. Four lines set out in 4 cardinal directions, starting 3' from a burrow. Vegetation heterogeneous, so line covers most differences. // In this area grazing pressure causes Bouteloua gracilis to increase, Agropyron to decrease. Stipa comata soon goes out under grazing. Carex filifolia present & considered good grazing; green early & late, & last to disappear under grazing pressure. Can get grazing dope from SCS in Dickinson. // Put out new set of 4 transects on upper slope of Beef Corral town (~~abt 3½ % slope~~ 5% slope). Approximately same species here as in Lawson Canyon town. Much activity in this large Beef Corral town. No juveniles definitely seen. (Artemisia frigida increases under grazing pressure. Potter agrees ~~that~~ C. l. probably cause of keeping down Artemisia longifolia (= cana?) in dog town. On slopes at head of town, Stipa comata common (less grazing); Andropogon scoparius, & Calamovilfa (sand reedgrass; coarse).

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May 21, 1955 Medora, N. Dakota

Warren Whitman of Dickinson Exp. Sta. believes range conditions this region not greatly different in past than in present. Chester Brooks has much info on Indians, horses, ~~buf~~ buffalo, grazing, + other historical factors this area.

May~~ch~~ 22, 1955 Light rain + overcast. Visited Big Plateau colony in Sec. 2. Saw at least 16 C. l. there. This mainly on long abandoned ploughed ground. Much Taraxacum on colony, + another similar plant. Some black lignite in mounds + some C. l. half black with it. Ground gently undulating, tho net slope near 0%. Badger dug holes present. Bob Morey, ranger, says he has seen badger here in daytime on occasions. Short Artemisia frigida present, + many 8" stalks cut, apparently by C. l. Edge this colony 200 yds. from edge plateau, then a drop of about 200' to a town below, to S. Surrounding colony are seed stalks of Art. fig. about 1' high (lacking inside colony, so apparently C. l. eat). Tufts of Stipa comata around edges (indicates little grazing). Ant mounds present. A small C. l. burrow under edge of two of these, one still with many ants in mound. Vegetation very heterogeneous. At base edge some C. l. mounds, short Art. fig. thick. ~~Ar~~ Around some mounds, Art. fig. + rose to 10' from burrow, then Bromus 6" high dominant. Some ~~Bromus~~ Bromus on mounds, + growing much more vigorously than around. Several antelope, + sharp-tailed grouse, seen nearby. In thick grass near at hand, runways of a vole. // In Knudson Creek canyon on gentle green grassy slopes near bottom there are a few colonies. At one of these, local ranchers poisoned in 1953, + many C. l. found dead on ground. Adjacent ground has much long leafed sage. Same seen last summer on poisoned area, but none seen in brief visit today (spider webs in

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May 22, 1955 Medora, S. Dak.

burrows). We saw 2 C. l. in Knudson town farthest upstream. Evidently, then, few or no ~~dogs~~ dogs in towns in Knudson Creek, Paddock creek (lower at least), Lawton draw, Johnson Plateau. Could an epizootic have hit these? // Gunnar Johnson, employee, said that he noticed diminution in Lawton draw colony about Sept. of last year. // Jim Cole & I visited East Entrance town, in Sec. 28. This is a small town that has changed little in size since 1947. About 5 acres. Carex, Opuntia, Agrop. smithii, Art. frig., Sphaeralcea present, ~~or~~, as well as Bouteloua. Artemisia branches 8± " long cut down at some sites. Some pawed old burrows into edges thicker wheat-grass downslope. Upslope colony has several holes above road, & some fresh droppings & cuttings there, but little evidence of much use of burrows. ~~Art.~~ Potentilla leaves also cut. Cactus not eaten. Many badger diggings. Cole says bobcats have been seen here (checking station nearby), & probably little grazing by cattle as far from water. Some Allium. Above road many well developed shoots long leafed sages so probably relatively little C. l. pressure. Art. frig. taller than on lower part town. One burrow under edge of asphalt at edge road. A report of Neil J. Reid (June 1953) says this colony on a small island of clay loam. // We visited the Goins town, Sec. 29 & 30. Reid (June 1953) said this large, but of small population, located on silt loam. He said large patches Salsola & many devegetated areas. On abandoned agricultural lands. Heavy grazing (Reid). We saw many C. l. here. Around it, thick growth Agrop. smithii. In center, much Sphaeralcea, & areas of Erigeron, Plantago purshii & dandelion-like forb (as on Big Plateau). Gentle slope to W. This

Cynomys ludovicianus

May 22, 1955 Medora, S. Dakota.

in bottomland area among badland buttes. Yesterday saw one Speotyto on Johnson Plateau colony. Pellets of fur (mouse), grasshoppers, insects. Bubo pellets of mice & insects, & Sylvilagus, no Cynomys. May 23, 1955. Set 12 traps (live) on lower Paddock town at burrows where C. l. seen. Apparently only about 15 dogs (not incl. 3 juvs. seen one burrow) on 30 A. (est.) colony. Dogs scattered over colony, not in one group. // Visited Duney bottom colony. Highest pop. at foot of steeper slope, not on flattest low area. W. exposure. In a rather denuded area, a brown leaf-like alga common, Sphaeralcea, Plantago purshii present, & closely cropped grasses. Prob. due rains yesterday, much scratching of ground around burrows, to 8' distance. Some pounding of outside mounds with noses. Much Sphaeralcea on lower flat area. Some areas 1000± sq. feet, much Plantago purshii 1" tall (blue-green aspect). Patches pure Agrop. smithii, & on lowest slope toward river, much, near 3' tall Artemisia cana. At N. end, much of a purple-based grass, not Agropyron (= ?). // I shot a ♂. Back molted to tail. Testes 12 mm. long. wt. 1140 gms. Stom. 540 gms. Caec. 80 gms. Stom. held 60% green grass (= Stipa? Schedonnardus? – serrated edge), 10% Agrop. smithii, 30% small green pubescent forb. Old ♂ (by tooth wr. 5; femur 54; epiph. fused). // Loren Lane, ranger, said that ~~in April~~ on May 5 when reseeding Johnson Plateau, he saw a C. l. carry 2 young to another burrow in unseeded ground. // On Boot Creek town, just outside park, poisoned Aug. 1952, saw 25± C. l. & shot one ♀. Most in area above a spring. Formerly large town, perhaps 80 A. Much Sphaeralcea, Agro. smithii, grama, & Taraxacum that area. Horses grazing, & probably cattle too. At N end town, no C. l. seen. In same areas of mounds, Artemisia cana coming in, & seed stalks of Art. frigida

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May 23, 1955 JRNMP, Medora, S. Dakota.

prominent. ~~In~~ Another town on Sand Creek was partly on park land, also poisoned Aug. 1952. Little grazing on park, much other side of fence. On grazed side, old mounds with much of a mustard, (Descurainia) an amaranthus (?), a tomentose forb (Cryptantha). Pasture a mod. stand Agro. smithii, little litter or Bouteloua. On park area, mod. slope, Agro. smithii invading edges old mounds, but surrounding pasture mostly Bouteloua. Also on mounds, Salsola (new green, & old), Convolvulus, & Plantago purshii, & a Chenopodium ? Some mounds much Sphaeralcea all over. Some Viola nuttallii in barish ground. Plants on C. l. mounds mostly invading annual forbs, tho Agro. smithii coming up around edges. One mound in protected area, much Stipa comata around edge md. (slope). Where sod scratched out around mounds, now Sphaeralcea, Art. frigida, Salsola, bare ground - much still bare, with slight litter. (Beef Corral colony; a brown alga in flakes of sheets, not dry, common on ground. As N. of ~~Wellington~~ ? Waverly ?)

May 24, 1955. Rain on & off all day, but many C. l. foraging under complete overcast when cold & raining lightly. 72 live traps left set all night took nothing. Examined specimens. A ♀ taken in very thinly populated Paddock Creek town had scars & ovaries indicating that a litter of 8 had been produced.

May 25, 1955 I briefly looked at East Entrance town in rain. Ground saturated with H_2O at one low eroded area near road. At E. edge, taller grass started rather abruptly. Uninvaded area had fairly even cover of Agropyron smithii 8"-12" tall, with a few patches Bouteloua widely spaced, & some ~~Sphaeralcea~~ Sphaeralcea. My estimate is that the dog population has never increased so greatly here as to greatly modify peripheral habitat, so town has not increased in size. Probably

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May 25, 1955 TRNMP, Medora, S. Dak.

low productivity or high mortality plus good food supply on present area make expansion unnecessary. // Disappearance of dogs might be due to poor production of young or survival of juveniles in 1953, so these [no-yrl. can breed!] not produce young in '54. Thus, much of 2 age classes [= King idea] missing, & these might make up large part of population. // Rain today. I drove S. to Wind Cave N Park.

May ~~26~~ 29, 1955 Nr. Ft. Collins, Colorado.

Visited Spring Can. Dam colony. Saw at least 9 grown *C. l.*, & two groups of 3 juvs. Made overlay of map, showing locations. Area occupied has not expanded - short of greatest extent to S. & to NW. Scratchings & diggings clearly show where recent activity. Nearly all burrows where I had trapped showed evid. activity - not #2 & 21, 26, 29, or 30, however. On transect line *Agropyron smithii*, *Salsola*, *Sphaeralcea* now present, in addn. to Buchloe. ~~Lo~~ *Ag. sm.* sprinkled over area (about 4" tall), thicker & taller in bottom draws. Some *Sphaeralcea* in bloom. *Aristida* rare, but 6" high near #19, & green, with seed heads. Several burrows about 6" deep in old mounds that had no hole. Scratchings to 6' around many mounds. These generally bare the ground but leave *Sphaeralcea* + *Salsola*. No animals seen on slopes above 5% on E. side. (a few *Viola nuttallii* in area). Near #15 a newly dug out burrow (in older hole) under 1 x 1½ ft. boulder. More *Salsola* N. of fence than S. in dry bed pond, outer part, gentle slope, little grazing, but *Salsola* 2" high. Several burrows newly opened there. Two *Chrysothamnus* bushes 6" high, 1½' diam., located 5 yds. from hole #23, had 2" cut from tips many branches. Several 5" stalks *Art. frig.* also cut from some tufts. No sure sign activity at

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May 29, 1955 Nr. Ft. Collins, Colo.

#4, but diggings at adjacent #5 (~~several~~ some trapped at #4). Some mounds where no diggings, sparse stand *Ag. smithii* scattered over mound & bare ground adjacent. Groups of juvs. seen near #18 & #25. When alarm, one adult ran 30± yds. S. to 3 juvs. I set live traps baited with barley at mouth #20. // Visited Ohrel "ghost town" at foot Buckhorn Canyon on W. exposure, open meadow, 5-15% slope. *Bouteloua gracilis* dominant & fairly continuous, but sparse *Agrop. smithii* present. About 10 A. colony. Slopes to est. 20% had burrows. Burrows closest together at uphill edge colony, where slope steepened above (damper?). Pines surround area; *Cercocarpus* between pines & pasture. On old mounds, rather rocky & large, most conspicuous invaders: *Artemisia frigida*, *Bromus*, *Elymus*?, tiny blue flowered pubesc. forb, *Amaranthus*?, a short *Poa*, *Eurotia*, *Cirsium*, *Taraxacum*, another large composite. Collected samples invading vegetation. Not same species all mounds. No recent grazing, but droppings show old horse & cattle pasture. No sign of living *C. l.* Near Spring Can. Dam colony (100 yds. nearest burrow) found 4' long *Pituophis* crawling. Stomach empty.

May 30, 1955. About 9:30 a.m. visited Spring Canyon Dam colony & counted dogs. Warm but overcast. Made overlay of locations where 14 seen (not all at once; allowance for probable travel) in 3/4 hour; plus litters 3 & 5 juvs. Black widow spiders & webs in mouths unused burrows. One *C. l.* on slope 100 yds. E. of #15, at burrow; about ~~10~~ 15% slope. Visited dump colony & saw 4, no juvs. One 80 yds. in from SE end colony, another 100 yds NW of it, & two 200 yds. farther NW near NW end colony, all on E. side bottom. No evidence of gathering together. Saw 1 baby *Sylvilagus* at burrow mouth.

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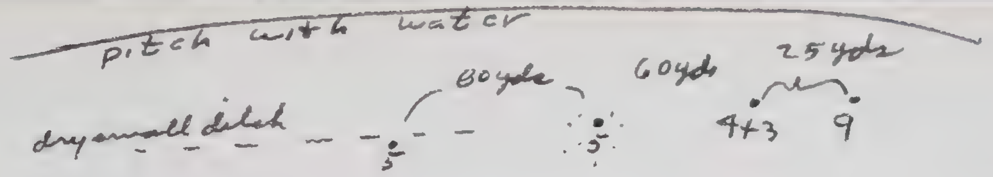
At 5 p.m. saw 3 Sylvilagus at mouths peripheral burrows (one obvious baby). // Spr. C. Dam. #18 + small hole ~~crater~~ 5 yds. N. probably connected; trap set next to #18 where 3 juvs. seen yesterday; juvs. at other hole today. At burrow where 5 juvs., all went down hole with small rim, 5 yds. from larger mound where they spent much time. // In horse pasture, Sec. 3, 6 mi. S. 2 W. Ft. Collins, saw one litter of 3 or +. An adult went down same burrow. // Dump colony. Saw Canthon beetles rolling dung. Salsola 2" high, green, is main green cover. Much Buchloe brown & perhaps dead. // Thought: in small colony, predator such as ~~fer~~ ferret or badger could make clean sweep, kill all.

May 31, 1955 About 8:30 a.m. counted C. l. at Spring Canyon Dam colony. N. of fence saw 5, plus 1 juv. at #5 burrow. S. of fence saw 5 (2 at #15, 1 at #26, 2 near #12), plus the two litters. Total 10 + 3 litters (of 1, 5, 4). Calm, warm, partly overcast. // At Dump colony saw at least 5, in about same area as yesterday, but one 30 yds. W. of bottom near NW end colony. No juvs. All (but 1) on SW slope, 3± %. // At Sec. 3, 6 mi. S. Ft. C., shot ♂ 125. Molt line just anterior to root tail. 15 ± fleas. It was in crater 5 yds. from where 4 juvs. played on mound. Later some juvs. seen to go down this crater. About 200 yds. to W. on same (S) slope, 30 yds. from creek bed, saw adult with litter 2 juvs. No other litters seen on S. slope. // On N. slope where barren, ~~at~~ near old pond & downslope from an irrigation ditch (now full water, 3' wide), there were several litters. From W. to E. numbers juvs: 9, 4 + 3 (10 yds apart; same?),



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5, 5 (spread 10 yds.; same?). These in area about 150 yds. by 70 yds. (2A±). One or more ads. near each little litter. Young lay on bellies on mounds, pestered adults, fed. Spread widely (10± yds.) but gathered at one (or 2) burrows in alarm. allow approach to about 30 yds. Juvs. give jumps up + bark. All these on N. slope between irrigation ditch + fence (max. 70 yds. distant) on est. 5% slope, at mid slope or higher. One burrow appar. badger dug as large bore, but 4 juvs. entered. Another 1' wide bore, possibly from erosion; juvs. entered. One crater where juvs. showed scratchings toward hole all around. / At least 4 ~~3~~ litters I have seen so far seen so far use 2 holes, about 5 yds. apart, one a crater + one a rounded mound (probably underground connection). // In Sec. 4, fall planted wheat field being ploughed up today. What will be effect on dozen or + C. l. that fed there (~~some~~ many burrows too). // About 4 p.m. visited Sec. 4 colony. On the unploughed bottom near S. side I saw litters of 2, 6, + 7 juvs. in a line 50 yds. long; 50 yds. to W from the 7, a group of 4, + 50 + 100 yds. from ~~that~~ ~~one~~ group, litters of 2 + 5. Saw a few C. l. at burrows in barley ~~wheat~~ field on S. side, but only one litter - of 5, on flattish ground. On unploughed ground 10 yds. above edge of this field, another litter of 5. // Not easy to trap juvs. They did not eat grain or carrot bait put out in live traps near burrows. Set steel trap one hole where 4 seen; in 4 hrs. no apparent activity there, but the 4 out a hole 5 yds. distant. Put live traps directly in front hole where 4 went in; no catch in 4 hrs. Took up all traps. Saw one Swainson hawk near colony.

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June 1, 1955 Nr. Wellington, Colo.

Visited Wellington preserve colony. 10:30 a.m., 30 mph N. wind, hazy. (Q. – Do juvs. feed more close to burrows than ads.? – age diff. in food habits). In area greatest concentration, where most feeding, an area of about 1 A., I counted 7 old + 17 juvs. Litter of 5 juvs. at burrow with ~~Charlie~~ "Charlie." Litter size: 5, 5, 3, 1, 2, 1 (last 3 gps. prob. scattered; not best possible count). Alongside dirt road, just above ~~it~~, groups 8 + 5 juvs. at two mounds 5 yds. apart. (I set 5 live traps there. These took 2 ad. ♀♀ (#126, 127) and a tiny juv., which I kept for *pet* (or "Herman"). ♀127 in trap with juv. These ♀♀ prob. mothers of litters seen.) In southern part preserve where population sparser, litters 1, 5, 2, + 1 seen. One *Circus* seen over adjacent area, hunting. No other hawks seen. Several old *C. l.* carcasses I had thrown out had been scattered 10 yds., but little eaten, mostly fly eaten + dried up – so few carnivores?. Saw 1 *Citellus* 13-*lineatus*. Saw 3 *Speotyto* on colony, + 1 or 2 killdeer. Saw owl standing 4' from *C. l.* – *no* reactions seen. In area where *Distichlis*, *Iva*, thick, abandoned burrows 50% reveg. with these species. Made overlay of horse pasture map to S., showing 13 *C. l.* seen, + location 4 litters (3, 3, 5, 5). // I heard that Joe Hopwood had found fox den (red?) near Spring Canyon Dam with *C. l.* parts scattered near.

June 3, 1955. Half overcast, cumulus, + wind about 20 mph. I visited Spring Canyon Dam colony + saw 9 grown + 6 juv. *C. l.* Made overlay of map showing locations. No new juvs. seen, + one litter not out. // At Dump colony I saw 6, 4 singles about 50 yds. apart, + two that ran to same burrow about 100 yds. short of SE end colony. All but 1 in line 300 yds. long, one 100 yds. to

Cynomys *ludovicianus*

June 3, 1955 Nr. Ft. Collins, Colo.

W., across a draw (5 A. max.). // Then at Section 3, 6 mi. S. of Ft. C., made count in area between fence + irrigation ditch on N slope. In that area (~~2 A?~~ 4 A?) saw 6 ads. + 26 juvs. Juvs. in groups of 3+3+2+1 (= the 9?), 1+4, 4, 3+3, 2. About 50 yds. E. of NE corner census area, just below fence, ad. + 4 juvs. // On S. slope saw juvs. same 2 sites as before, ad. + 1+2+2 juvs. within distance 50 yds. at site 200 yds. E. of W. fence. This census about 12:30 p.m. // One new burrow just below small reservoir dam (4' high) where *Salsola*, *Poa*, *Sphaeralcea* cover scattered, about 75% ground bare. Scratchings to 2' around. On S slope, 6 separated grown *C. l.* seen but no juvs. with (poor production on this S. slope, excellent on the N. slope? – N slope is lower, nearer reservoir + irrigation ditch, so plants grow larger, + possibly more forbs. // One burrow in top of dike bulldozed within last 2 months. Clay-loam, so soft that I could push lathe into it deep without pounding. Appar. wide tolerance for hardness of ground for digging – use anything that can be dug + that does not cave in readily. // Saw 1 Swainson hawk over colony. // Section 4, wheatfield. On S. side field where sparse stand ~~wheat~~ barley to 3" tall, two seen at burrows 50± yds. downslope from S. edge field. Some older burrows in field showed much construction by scratching all around, tearing up some wheat. No prominent cutting of wheat stalks or digging out of seeds. In some parts field a burrow about each 20-25 yds. Many new or newly opened, but none shallow. Some new burrows on unploughed slope above wheatfield. This slope 50 yds. wide, ave. slope (N) 15% estimated. Atop slope ground nearly flat + a very sparse stand wheat with many forbs admixed. No definite, new sign *C. l.* here tho

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June 3, 1955 Nr. Ft. Collins, Colo.

one of old burrows scratched out (old C. l. droppings). Probably not now active in top field. Only burrows ~~south~~ rather low on slope surely used - range contracts winter? // On unploughed flat, near S. side, several litters seen. Saw 2, 4, + 5 juvs. in area 30 yds. long. also 2, 2, 1, 1, at separate sites in same 2 A (staked out a census area, approx. 2 A). // A few days ago the fall planted field on N. side valley was ploughed. I searched for signs reopening of burrows. One 100 yds. in opened (one below during ploughing?). A formerly prominent mound now not used. A few within 10 yds. of W. edge field opened, but none on S. side where formerly a small mound every 20 yds. in area where 13 once seen feeding. Near W. edge one saw 3' long dug up to 2" deep, apparently by C. l. Little grass or forbs now on this field; not planted. Ploughing discourage C. l.? or gone elsewhere to feed? In Ross pasture, just W. of this field, ~~near~~ hundreds old mounds evenly spaced up slope. Saw some C. l. at least 200 yds. into this field, + 3 litters near E. edge. Was Ross field poisoned 4 yrs. ago along with ~~Sec. 4~~? Spr. Can. Dam? // Productivity apparently good on S. side of flat bordering wheatfield, + in area just W. of fall planted field. Not so good at burrows in field. One litter just above the S. barley field ~~wheatfield~~. // "Herman," small juv. taken June 1, ate rolled oats as soon as offered, but grain common food at site capture. After first day showed no fear. Yelps when roughly ~~roughly~~ handled. Eats everything including dog food cubes. Fond of milk from dropper, but bites glass tip hard. Now walks around house + comes for food when proffered. When apparently angry, makes rapid throat-chattering (5 chucks), descending in scale, repeated.

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June 6, 1955 Boulder, Colo.

Found that Ronald Smith had left for Kansas Univ. to study prairie dogs. Read eagle thesis (MA) by D'Astilio (1954). He investigated several eagle nests in foothills from Boulder north & found C. l. remains in them. Including old remains, about 75% of skulls found near Round Butte eagle nest (N. Larimer Co.) were C. l. Thesis bound in main library. // Visited C. R. Kalmbach, retired from F & WL Service, formerly in charge Denver Lab., & told him about my work. He told me that Crandall (of Montrose, Colo.) has had most experience with C. l. control. Welch (J. F.) has had experience with repellents. Maynard Cummings (now Sacramento, Calif.) formerly worked on Grand Mesa gopher project. This started out elaborately but ended in so little of value, mainly because of high remote location. On gopher project some indication moving out when forbs killed by herbicides. Some vegetation studies made too. See records gopher project at Denver lab. // Re 1080 poison, Kalmbach said this most dangerous all rodent poisons from standpoint secondary poisoning. Ferrets might well be killed by eating 1080 poisoned C. l. Strychnine much less dangerous as far as secondary poisoning is concerned.

June 7, 1955 Nr. Wellington, Colo.

Counted dogs on 2 A (±) census area in preserve at 10 a.m. After many counts got 11 grown + 34 juvs. There were 14 juvs. at SW corner where principal ground cover Kochia about 1" high; these might have come from across road, 100 ft. to E., where I saw none but where 15± on last visit & where I took 2 mothers.

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June 7, 1955 Larimer Co., Colo.
(♀128, 12a)

In trying to live trap some of these 14 juvs., took 2 mothers instead. Kept for examination. Also a 2 A. saw 2 Speotyto & 1 Citellus 13-lineatus. One owl stood calmly at mouth burrow (nest?) 6 ft. from 2 grown C. l. at crater burrow. No reaction between C. l. & owl. No react C. l. when owl flew over them + landed 8' from one. Max litter (juvs. on 1 md.) = 11, but ~~several~~ a few other juvs. within 10', so litter somewhat mixed now. Saw 2 ~~ad~~ grown C. l. at one burrow with juvs. Apparently mothers not hostile to all others at this stage. Chrysothamnus greening to 4" on main part town, Much Kochia to 1½" but little of last year's present (cut when gets taller?). // Hopwood, Joe, found apparent fox den near C. l. town 6 mi. S. 2 W. Ft. Collins. At entrance some old bones, mostly rabbit, but 2 definitely of C. l. 50 yds distant from burrow were 10± C. l. burrows, one showing much recent scratching, one closed up with surface tamped. At CPER too I saw one filled like this - why? // In horse pasture just S. of Wellington colony I made overlay maps of C. l. seen. Many more juvs. out than on my last visit here - at least 29 seen. Max. litter size 5 or 6. Saw at least 2 Speotyto, 2 Citellus 13-lineatus on ~~that~~ colony. // Two trapped females left much excrement in traps, this dung loose & wet, with horse manure smell. // I went then to Sec. 22, CPER, Weld County.

There at 1:30 p.m. sky 8/10 cumulus. Saw at least ~~25~~ 28 out on colony, but no juvs. A Speotyto at burrow by stake ~~10W8~~ 10W8S, & casts there (mouse bones, beetle elytra; red grasshopper legs on ground). One Sylvilagus at burrow near 18W6S (20 yds.

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June 7, 1955 Weld Co., Colo.

E. of) on flat bottom. Saw *no* juvs. - not out yet? No *Crotalus* seen in many burrows inspected (overcast). *Eriogonum* (low pubesc. leaves) with seed stalks to 5" tall, *Bouteloua* to 3"; *Salsola* to 3". Some *Allium*, *Sphaeralcea*, *Lupinus*, in bloom. Much water standing in bottom ditches, & signs of washing dung over all flat bottom. Two mallards on pond. Killdeer walking on colony. At NW end colony, near 30 W 2 N, 4 new burrows, extending length colony. One only 16" deep. Ground 50% bare there; slope est. 3%; *Ag. sm.*, *Eriog.*, *Sphaer.*, *Aristida*, *Opuntia* at site. Ants (*Pogonom.*) active at edge one new mound. Another new, or freshly opened, in old ant hill, 50' W. 6' S of 22 W 6 S. Several other new diggings seen, as of new burrows, mostly deeper than arm length. Much scratching up to 6' around some mounds; rain appar. stimulates work. Some very small new mounds packed with noses. A few places scratching at 1 spot to 4" deep; hunt insect? no root end found in. // Probably water table in bottom high & may have driven some from burrows there. None seen feeding on bottom. // No hawks or fresh sign carnivores seen. General aspect of country green, but some hillsides mainly brown. Cattle now on CPER part of sec. 22.

June 11, 1955 Rapid City, S. Dakota

Leslie Albee, Soil Conservation Service, will help make range analyses in Wind Cave N.P. in July. He is a varmint shooter & used to shoot at a dog town in the badlands (town later poisoned). He had heard of fair sized town near Wall. Devil's Tower, Wyo.

June 12, 1955. Supt. Raymond W. McIntyre has been here since 1947. He said there has never been any official *C. l.* control here.

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June 12, 1955 Devil's Tower, Wyoming

but actually some was done near boundary. In files, a letter from Mc Intyre dated 12/7/48 said population of town showed "definite increase." James Cole in Sept. 1947 estimated 1300 dogs on 39A of town (40.14A) in monument area. Mc Intyre said badgers seemed to work at periphery of colony, where burrows presumably shallow, & mostly in winter, tho few last winter. // Letter from Newell F. Joyner, custodian, to George M. Wright, Dec. 18, 1933, said about 100 dogs in colony, reserve not fenced, & some stock grazing there. // Letter Wright to Joyner, Dec. 11, 1933, said "Mr. Dixon" made rough map showing dog town 40-50A, betw. main road & river, estimated 100 dogs in 1931. // Park problem is to keep *C. l.* on preserve & prevent spread to private lands. // A U.S.G.S. man working here said ~~that~~ he knows of more than a dozen *C. l.* towns outside of the monument in this (Crook) County, but that the colony here is the largest. // I walked around the town. At one point on NE side it had spread down a 10'(±) bank to a lower terrace, still 10±' above river level, for 50± yds. Here soil sandy, having little ~~[illegible]~~ clay, & would not form a ball. Some burrows, apparently not now used, among 1' high shrub (*Symphoricarpos*?). On this level, perhaps sometimes flooded out by river. // Cutting of tall plants obvious some sites. *Astragalus* cut (bearing 3/4" diam. fruit now), & ~~[illegible]~~ others, but mainly a sage (*Artemisia cana*?). In some areas, much sage about 10" high, about 1/5 cut down. // A few burrows seen filled and tamped at surface — why? — perhaps excess entrances to burrow. Especially in areas where *Aristida* prominent, many diggings about 1" deep. Some mounds of fine sand,

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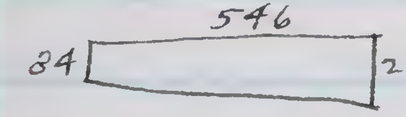
June 12, 1955 Devil's Tower, Wyo.

but not notably large. Top layer of soil probably more clay than deeper. River bank shows alluvial soil here deep with little rock. A few burrows near oak trees; one 1' from 4" diam. trunk of 9' high tree. *Artemisia* bush 3' tall had many 3/16" diam. branches cut (by *C. l.*?). At edges one mound, much *Art. frigida* about 8" tall; about 15% of stems cut. On SE slope above road, gopher mounds & casts of burrows in snow. On this slope, few burrows where *Aristida* dominant, none where *Andropogon* dominant. I found 2 skulls *Procyon* near edge town near river. Staked out an area next to road, about 2 Acres ~~≥ 4A~~ 

estimated. Counted 25 & 27 *C. l.* there (no juvs.) about 7 p.m. (fewer later), & ~~of~~ 33 at 5:45 (a few juvs. included). Few juvs. out. No large litters (>3) seen. Overcast all day but mostly clear 5 - 7 p.m. Took ♂ 130 for examination.

June 13, 1955 Commenced mapping *Cynomys* colony outline. Limits very close to those mapped by James Cole in Sept. 1947, especially considering methods used (plane table & stadia) & differences in estimate limits. Yet burrows to periphery mounded area occupied. Possibly SE sector has smaller population than before. This has been an exceptionally wet spring, overcast most of time for about 3 weeks & often raining. Fine growth forbs obscures bare soil on many old mounds. Little grass apparent in dog town except where *Aristida longiseta* common. Some *Agropyron smithii*, *Buchloe*, & *Bouteloua gracilis* present. SCS man, Dickson, from Hulett, said he would consider pasture condition on dog town "poor," all gone to weeds. // Saw many juvs. out today; warmer & sunnier than

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June 13, 1955 Devil's Tower, Wyoming

yesterday. I saw a few litters of 5, none surely larger, judging by no. huddling one mound. // About noon on 2A census plot near road counted 26 grown & 19 juv. C. l. This is high density near road where fed. After one car fed dogs, about 8 grown ones within space 5 yds. wide. // Juvs. more shy than many older dogs. I set live trap next to burrow with juvs. One came out & fed by trap, but an adult ♀ caught (released). Feces adult green, loose, wet, with horse manure smell. // Near road some C. l. can be fed from hand. Some are killed on road. One found dead near road. A few seen to walk across paved road. Some burrows at very edge pavement. A few in dirt parking area where cars pack soil repeatedly. This substantiates my thesis that food determines presence & absence, & where burrows dug. // Several dogs seen to scratch from time to time. Some harvester ant mounds & some other ants on area. They quickly started eating bits of walnut put out for bait. // Sue & I saw what appeared to be a Citellus 13-lineatus at two burrows, far apart. I heard apparent Speotyto once yesterday. // On colony I found no fresh carnivore digging & found no carnivore scats. Crotalus apparently rare this area. Geological Survey men have worked here several summers & have rarely seen one. // Several Pica on colony, walking about, apparently feeding (on ?). No reactions with C. l. noted. Two adults often seen in same burrow. // Supt. McIntyre said ~~for rabbits~~ he knew of no Speotyto on colony in past years. Bobcats present but not common; not seen to take C. l. here.

Cynomys ludovicianus

June ~~15~~ 14, 1955. Devil's Tower, Wyoming.

With George A. Dickson, S.C.S., Hulett, Wyo., looked over colony vegetation. Unfortunately he knew little of plant identification or indicators. He said that colony area would be classed poor because all gone to weeds. I got range condition class sheet for this area from him. In some parts colony, such as W. corner N. of road, much Bromus tectorum about 8" tall. Near old & used mounds this taller & headed out conspicuously more than on surrounding area, & little Agro. smithii where Bromus thick. Possibly C.l. keeps Ag. sm. down so Bromus increases, or area denuded & Bromus invades before Ag. sm. / On hillslope wash area, Andropogon scoparius, some Calamovilfa, & no C.l. tho much bare ground between tufts & soil not excessively rocky—unstable at some seasons? This is red-bed soil which erodes easily. Most soil on colony silty-loam, judged Dickson. Near river burrows in fine sand, which would seem to cave in in burrows if dry. // In slightly low areas in colony, Artemisia cana (?) about 4" high is dominant plant over hundreds square feet. Many stalks of this cut & left, apparently by C.l. Evidently they keep this brush low although may not be able to eliminate it once of bush size. No other shrubs noted in main C.l. area. // A band of oak, ash, & shrubs near SW edge colony. ~~Where~~ In this band, 10 yds. wide of shade, some C.l. burrows, not much used now. One at base 14" ash; two more 1' from base others, all in shade, in one narrow strip. In shade beneath oak just SW of colony, other old burrows. Apparently at periphery unfavorable sites used for burrows. This might lead to penetration barriers & crossing of wooded ditches, steep banks, etc., & allow quick reinvasion such areas in times population pressure or favorable conditions.

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Brome heads out ~~earlier~~ earlier on & near mounds than in areas between mounds. // At 11:40 a.m. censused area #1: 29 grown, 18 juvs., largest apparent litter of 4. This jibes closely with previous counts. 15/A + 10 juvs. per A. in round nos., & this near maximal. // At S. edge colony next to fence I staked out approx. 1.7 A. plot (area #2) where little grass save Aristida, & thick growth forbs about 4" high (mainly ~~unknown~~ unks. A, B), & Sphaeralcea common. Latter has not flowered yet here (but along roadsides near Hulett). Some vetch in flower (purple), & yellow spurge near river (not on dog lawn). // I put in 4 steel posts for 6×6 exclosure within census area #2. Some forbs prominent as in area (A 25%, B 25%, other forbs 25%, Aristida 15%, bare & litter 8%, Sphaeralcea 2%, Ag. smithii trace; these gross estimates foliage). // Astragalus plants about 1 ft. wide persist at edge some used burrows. At S. fence, several burrows at base wooden posts. // Step point density tried ~~but~~ but point difficult to define among single stemmed forbs. Loop litter, or point using foliage rather than root crown. // I examined enlargement of ~~air~~ aerial photo BBU 32-97, date 8-29-38 (1938). This showed old CCC camp W. of colony, & main area of colony dotted with burrows. Evidently at least 35 A. in town at that time, tho not surely extended to SW of the line of trees & shrubs near that end. Hillslope area poor but apparently burrows close to present NW extremity & on river bench at NE end, where now. So no great change in period of 17 years!

June 15, 1955 Put up 6'×6' exclosure (of C. L.) with 2' high 20 ga., 1" poultry netting. Location shown on map. Collected plants on mounds at NE, SW, & NW parts colony. Mostly these similar

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diff. sites, but ~~diff~~ relative importance differs between sites, & a few only at one site. Sphaeralcea one of most common invaders of mounds, used or old. Saw several beetles (Canthon) some burrows; Agropyron smithii (= Asm.) a minor invader mounds. Some plants thick at one mound but little in surrounding area or other mounds (clover on one, e.g.). Perhaps mound area frees of competition!! On S. slope of red bed soil, 10% ± slope, Phlox, Sphaeralcea, Bromus, & others invade ~~mounds~~ mounds at burrow entrance Bromus (tectorum) sometime very vigorous so twice size of surrounding plants. Rosa sometimes invades mound area, or persists there, but kept to 4" height, presumably by action C. l. // I watched one eat leaves of Bromus. Some went thru fairly thick grass about 10" tall, where no trail, but when sit up head is above top grass. This sets height tolerated vegetation? At close range I saw one Citellus 13-lineatus. // Near road many people feed popcorn, pretzels, cheese crackers, peanuts, bananas, etc. to C. l. A few eat from hand. Juvs. at burrow sometimes allow approach to about 8', but do not come to hand. C. l. certainly a prime tourist attraction here. Most want to feed C. l. at close range or photograph them. One boy sat on ground feeding popcorn to 4 within 5' of his feet. Response of C. l. to oat grain not strong - apparently too small to be readily seen. A rock thrown attracts them quickly to that spot. // On 10% S. slope Rosa increases in size on little used mounds; doubtless the C. l. normally keep it down. Likewise they keep down Artemisia cana, but probably they increase area over which it grows. At one site at NE end colony, where adjacent range Asm, Bromus, Sphaer

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alcea, & a small mustard (uninvaded area), a single burrow was surrounded by conspicuous area, 5' in radius, where *Artemisia cana* 10" high & covered about 20% ground (scarce in surrounding zone), & little *Asm.* mixed with it. It appeared that *Art. cana* increased when freed competition of *Asm.* or other herbs. // At ~~NW~~ NE ~~hillslope~~ end, uninvaded grass about 10" tall (*Asm*; 30%), but about 30% ground bare. No barrier save *scarcity of edible forbs*, it seems to me. This also true on S. slope near NW extremity where uninvaded part principally *Asm.*, *Sphaeralcea*, *Bromus* too. // On census area #2, around exclosure, made 3 counts at different times day, getting 14-15 grown *C.l.* each time. *No juvs.* seen there, or in any area more than 200' from road, above & below — why? Suzanne Koford noted same independently. On S. slope, 10%, N. ~~[illegible]~~ of road, red silt loam soil, some areas thick *Aristida*, largely old & dead, but nearly pure stand. ~~Some~~ Several unused but few used burrows in the *Aristida* area, so apparently do poorly there tho will invade on occasion. Areas of little-used mounds had good growth forbs, & these might be food for a few *C.l.* whose activities would open more burrows & increase forbs. // Harvester ants have small mounds, sitting on many *C.l.* mounds, apparently utilizing high spot for their nest. *Astragalus* common invader mounds too. *Viola nuttalli* invades mounds to small extent, red bed S. slope. Perhaps highest burrow density is N. of road across from census area #1, where soil red & slope near 10%. ~~Steepest~~ slope occupied on red bed soil is 15%. S. of road slope of most area is

To do - Devils Tower.

Plants:

Relative importance invaders on rds - censuses.

Composition + bare ground in census plots (2)
+ perhaps red bed 10% S. slope.

Burrow density diff plots.

O. I.

Counts grown + juvs. diff. sites:

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close to 4%, altho appears near level from distance. // Aristida bunches ~~make~~ prominent mounds in Aristida area where no current c. l. activity. Old bunches - few new Aristida plants seen (means ?). Opuntia on S. slope but little sign eating it (some old eating leaves + buds. Not yet in flower). // All people say this unusually wet spring - little sunshine for last 3 weeks. Same period last year much drier. // At onset light rain c. l. activity seemed to be increased (or unchanged), not decreased, but in fairly heavy rain few out. // The red-bed soil considered very good agric. soil but erodes easily. Many c. l. mounds of this had many cracks as of mud. // I weighed sandstone rocks in some mounds + found max. to be 150 grams, many 100. These light in weight; about 3 x 2 x 3/4" size.

~~July~~ June 16, 1955 Wind Cave Nat'l Park, S. Dakota.

about noon of warm partly overcast day drove past Norbeck Dam town + saw few out. General area green + not apparently denuded. // about 1 - 4 p.m. I was on terrace of Shirttail town, where John King made his studies. I put up stakes around area of his original Ward A + at area of expansion to SW. On original area of about 5 A I saw only 4 grown + 2 juvs., but perhaps not many out. No high densities seen in any part colony. Some burrows plotted as simple holes by King (1949) were still just holes. Some burrows had closed from disuse, some were not on King's map. At W edge of Ward A, a dense stand of Bromus, + colony limit short of this, not having extended notably since King's work (1950). Slope + soil favorable, it appears. In area of expansion to SW, apparently much increase in number burrows since 1950, + a new group

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of about 15 (much activity here) added 50 yds S.W. of that extension. This last 15 in area about 100' in diam. (= area x) surrounded by fairly pure stand *Bromus*, but having on it mostly forbs & some *Asm*. Belt of *Bromus* about 10 yds. wide separated from rest of colony, & a trail going thru the ft. tall grass. To W. of *C. l.* colony here, slope steeper, but only about 10%. Much ?: *Bromus*, in fairly pure stand on this invaded E. aspect slope. Around one mound in area *Bromus*, *Asm*. prominent, as if *C. l.* may favor it over *Bromus* on same sites, in 20' radius around burrow. In old SW extension area (King 1950), 2 new burrows, about 16" & 22" deep, freshly dug, where *Asm*. + *Bromus* & 50% bare ground. In general, low population on Ward A of King, little expansion of area, but filling in of invaded area & a new extension to SW. on same general level. // About 1/4 mile up canyon to W. of Shorttail Ward A found nest of *Aquila*. Two flew about, chicks with mostly light feathers in nest. This only 300 yds. from parts of *C. l.* town. // At least 2 burrows on Ward A appeared to have been dug out by *Taxidea* in past. On Ward B still mod. no. dogs, tho mostly forbs there (same forbs as on Devil's Tower colony in general). Wind Cave Nat'l Park, S. Dak.

June 17, 1955. On Ward A, Shorttail Canyon, counted 9 ad. 7 juv., at about 4:15 p.m. ~~May~~ Largest group juvs. 3. 9/10 cu. & cu. str. clouds. Calm. // There are 4 saucer shaped depressions, apparently buffalo wallows, now on this colony. King (1950 work) did not mention them (says were there; verbal). Some antelope & possible elk droppings on colony here. I collected plants growing on mounds now used: *Solanum*, *Amaranthus*, *Artemisia frigida*, & others. Magpies & crows seen on ground in this colony. // In canyon broad bottom, S. of road, ~~near~~ at downstream end of colony, I saw 7 grown

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C. l. in area where about 30 burrows (about 1 A.). Much Asm. grows there, & blue-flowered Tradescantia. In downstream unmowed area a tall mustard dominant. // In SE part Ward A there are many pockets about 6" wide, 4" deep, about 3/square yd. for several sq. yds., that may have been dug originally by C. l. Most in area of thistle poppy?: // 2' from one burrow, 7 cut stalks Sphaeralcea at one spot. Pieces 3-4" long. Much scratching around burrows toward mounds, & prominent recent poking by noses. This probably response to rain of ~~this mo~~ last night. // In general Ward A appears 50% bare. Some patches Buchloe & isolated tufts Asm. Heterogeneous distribution of plants as if soils complex & mixed. // In NW corner Ward A, much ~~ASM~~ Asm. (Albee says it may invade by vegetative growth at some periods, short at others). No Bouteloua seen on colony. // Heaviest C. l. concentration on Ward A seems to be SW 1/4, where mds. large & ~~to~~ close & 4 grown C. l. seen. Thistle poppy about 1½' tall with heads away from burrows, short without stalks near. Death camas 1½' tall & apparently uncut near edge colony just W. of Ward A, but some stalks cut on bottom in NW part of whole colony. // Bromus & other grasses tall in Opuntia clumps. Probably moister, seed protected, close grazing prevented there.

June 18, 1955. Visited shorttail colony for 2 hours with Les Albee, SCS, Rapid City. He is intimate with plants & range conditions this area; quiet & clear in explanations. He is enthusiastic varmint shooter & there interested in C. l. & woodchucks. Ward A would be "poor" in range condition classes, & the bottom, tho good grazing, no better than "fair" because of large proportion annuals. Possibly some "good" range condition on Bison Flats town. Psor-

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alea has large perennial root that *C. l.* could utilize. *Carex filifolia* green earliest & latest (some all year) of grass-like plants, & may furnish *C. l.* food in winter. *Carex* grazed very close some sites - much closer than cattle would graze - says Albee. *Stipa viridula* & *comata* are decreasers on range this area (& N. Dak.). *St. comata* now heading out in much of Wind Cave & gives drier aspect (yellowish) to range than a few weeks ago. I collected about 25 plants that *Albee* tentatively identified for me.// On S. slope of canyon, 1/4 mi. N. of Ward A, a rather isolated & rocky section of *C. l. town* where ground fairly denuded. Many mounds & apparently thriving population. Here *erosion* from water very apparent. Doubtless work of *C. l.* contributing to erosion here. Two kinds *Bromus* present - *japonicus* & *tectorum*. In a big patch (10 yds across) of pure *Chenopodium album*, many stalks cut as if eaten (2" high). Albee will return in July to work with me for a week. // I saw one *Sylvilagus* in dog town in bottom E. of "Ward A," another in King's "Ward G." At about 5 p.m. I saw 2 *coyotes* in Ward G. // In an area of about 3 A. at E. side of Ward D I counted 12 grown *C. l.*, no juvs. This area has little grass, much bare ground, so has aspect of bare ground with many *C. l.* mounds. Evidently population has decreased there ~~in~~ since year(s) past. Light rain in mid-afternoon. 1/4 hr. after rain *C. ls.* seen repairing mounds. In late afternoon few juvs. out. A few near camp ceased activity outside about 7:10 p.m., shortly after sunset.

June 19, 1955 Herman, pet juvenile, left in cage covered with canvas over fairly cold night (40°?). At 7 a.m. he appeared to be dead, but he was only torpid. Body cold to touch, surely < 70°F.,

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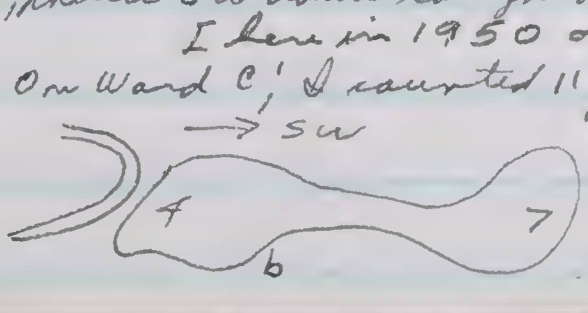
eyes closed. After a time in sun breathing at about human rate, still cold. Fed warm milk. In half an hour fairly active & soon normal again. When could not stand, 3 anal glands were ~~pto~~ protruded about strongly when body handled. // A magpie nest ~~at~~ in pine at edge Ward A; 3 young pies in it. About 8 Antilocapra on Ward D at once, two pairs sparring with horns. // Counts in King's area. Ward A – 8 grown, no juvs. ~~S+NE~~ corner (50 × 50 yds.) seemed to have little or no use. Adjoint area to S. & W., fairly uniform & nearly all within expansion reported by King as occurring 1950, I eventually got count as high as 10 grown, 22 juvs. (10:30 a.m.). One litter ~~5~~ close to S. side of W. part Ward A. Most apparent ~~littl~~ litter size 5. // On Ward B (we camped W. end) only 4 seen, no juvs. Lepidium & Chenopodium album thick here. // About 100 yds. S. of Ward A. a modified patch in Bromus – Asm. grassland with at least 1 ad., 1 juv. (= area ~~Z~~ Y). About 50 yds. SW of King's staked area expansion, area X, about ~~30~~ 40 yds. diam., with 2 ad. 2 j. To W. of King's expansion area 100 yds, upslope, area ~~20 yds. in diam.~~ 10 X 15 yds. modified (area ~~X~~ W), & 1 C. l. [probl. not] thought seen there. ~~Area Y~~ Area Y, about 7 well devel. mds. at apparently much used burrows, & 15± other burrows. Much bare ground & forbs, but ~~A~~ Asm. common. Separated by 10 yds. of 1½' tall Bromus japonica from rest of colony (2 A + 2 j. = family ?). Area "W" ~~X~~ separated from rest of colony by 50 yds. Bromus jap. (Asm, Sphaeralcea, others short). On "clearing," Asm, Art. frigida, Sphaeralcea, Lappula; about 7 burr. with well devel. mds. Set 1 steel trap here. // King's Ward C (1950) has extended to S across streambed, thence SW down canyon on bottom (call it Ward C' S. of dirt road). [here in 1950 or '51] On Ward C, I counted 11 grown C. l., 7 being in 2 A. at SW tip.



No juvs. At "b" a burrow enlarged to 10" diam.,

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mound flattish & well packed, no C. l. droppings or recent tailings from digging. This apparently den of a badger, for I saw one there 8:40 a.m. to 9:30 a.m. Of about 25 C. l. burrows within 100 yds. badger, one may have been badger dug recently, perhaps 4 in last year. Of 60± burrows examined in Ward C', only about 5 seemed to have been dug out by badger, none recently. (Area X has one badger dug burrow. at least 2 such just W. of Ward A. None fresh). // Albee - definition "overgrazing" means grazing that changes plant composition! Must separate term from overstocking, overutilization. // At SW end of Ward C', much Lappula & Asm. where dogs. Uninvaded area (a few unused & partly grown over holes) mostly Mustard 1½' tall, Asm. 1' tall, Lappula 1' tall, Sphaeralcea 6" tall. However, 150 yds. SW of tip C' & across streambed is forb & dog area of about 1 acre (=area ~~W~~ Z) in bottom. about 50 × 75 yds. size. Contains at least 3 grown + 4 juvs. Has 1 old badger dug burrow, about 10 obviously much used. To NW upslope (20%±) nearest currently used burrows 150 yds. distant (= area ~~X~~ Y). // At 2 p.m. 7 Antilocapra resting at W. end of Ward D. I heard coyote on Ward G. // Found a few stalks of death Camas (~~12~~-18"), some of Potentilla (6"), many of Artemisia frigida, cut on C. l. town. Also 4' tall Chenopodium (album ?) where thick on Ward B. // On both Wards A & B I found one apparent badger bored hole that had been filled up by C. l., & one tamped with nose. On Ward B, 5 apparent badger-bored holes (not recently bored) in diam. 10±"; & at least 2 others on that ward. On Ward A near stake $\frac{1}{M}$ e/f, an old badger bored hole had C. l. scratchings around as if to fill it at entrance.

June 20, 1955. At 7:25 a.m. I saw 2 badgers in Shirttail Canyon bottom ~~near~~ near site where one yesterday. They walked close to C. l. burrow showing recent repair, & seemed to look toward a C. l. giving alarm chirps 50 yds.

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distant. One *C. l.*, 75 yds. away, stood atop 1½' tall stump, 6" diam., to stare at badgers. Badgers ~~sh~~ seemed not to be hunting *C. l.* & walked into pines. // I caught parous ♀ in live trap at burrow where 5 juvs. seen yesterday (50' S. of stake $\frac{I}{J}$ f/g. Area 95% forbs + other, but some *Buchloe*, *Opuntia*, *Potentilla*. A ♂ ad. in steel trap in area Y, 100 yds. S. of Ward A, where juv. taken yesterday. *Psoralea*, *Asm.*, *Bromus*, *Carex*, *Festuca octoflora*, *Lappula*, *Astragalus*, *Plantago*, near site. // In area $\frac{Z}{W}$, bottom, saw 3 grown + 4 juvs. In alarm a female (nipples prominent) & another to one hole, a large ♂ & 3 juvs. to another. Juvs. mauled & fondled ♂, who did not seem to mind. // In one area where much bare ground, diggings 1 to 3" deep at bases *Sphaeralcea* — shell of a chrysalis in one hole (dig for larvae?). // Saw cut leaves prickly poppy. Near burrows these low & generally without heads, presumably due to *C. l.* activity. // Visited eagle nest 200 yds. W. of W. end Shorttail town. Under it where excrement fell I found a wet ball of hair (saved for exam) & old *C. l.* shell. From cliff top poor view into nest; no food remains seen in it. One eaglet, nearly grown. Both parents flew when area neared. // On Ward A most *C. l.* (4) seen in region of stake $\frac{N}{O}$ g/m, where mounds large. Near there two groups pits about 4" deep, as of old *C. l.* diggings for plants. These in circular patches about 10' diam. & possibly formerly associated with thistle bases. / Area $\frac{W}{X}$ apparently unoccupied now. Forbs vigorous + higher than near currently used burrows. // Saw one eating tip 2" of cut *Chenopodium* (*album*? - saved). It ran, carrying tip 10', finally dropping it. A *Chenop.* (*album*-like; saved) on Ward B sometimes cut in patches by *C. l.* (may be *leptophyllum*).

June 21, 1955. Clear a.m. but clouding. Near our camp two burrows with juvs. On & close to mounds, vigorous *Bromus japonica* stalks cut & eaten, tho not all of them, & seeds taken from heads. Mainly central more upright

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growth is taken. ~~In~~ At another site watched one feed. It pulled up stalk of *A. sm.*, pulling out of sheath, took a bite or two at succulent basal tip, & discarded the stalk. This repeated for many, so ~~mays~~ many cut but not eaten except at tip. Our pet "Herman" usually does not eat leaves of *A. sm.* but relishes a bite or two from tender white tip. // On Ward A (5:45 a.m.) I counted 8 grown, & groups 5 (or 6) + 1 juv. It is probable that 5 juvs. from litter 50' to S., where I trapped a parous ♀ yesterday. These 5 (or 6) juvs. with adult. Juvs. attach to ad. not mother when she is lost? In principal expansion area SW of Ward A I counted 13 grown (only 10 before?) & saw one litter of 6 at one burrow (300' W. of Ward A). Max. litter size here seems to be 6. // In area ~~4~~ 2, in bottom, 3 grown + 4 juvs. (together), as before. At E. end Ward D I counted there in plot; 9, no juvs. (Possibly 2 juvs. one site there.) Two were in patch of solid *Chenopodium album*. // In bottom near creek bed to S. of E. end Ward D, a conspicuous crater in a sea of *Bromus japonicus* with ad. & 2 juvs. Near md. *A. sm.*, *Lappula*, *Psoralea*, *Sphaeralcea*, *Cheno. album*, *Solanum*, *Amaranthus* (on md.). Within 10 yds. 2 other used-appearing burrows, & several old burr. in grass to NW. At least 20 yds. of solid *Bromus japonicus* dominance, 1-1½' high, separated from nearest area shorter grass, A. *sm.* Photographed this. Droppings found atop 1½' high boulder in open. // Are next burrows always with well-devel. mds.? // Ward A, new digging at some old burrows, or reopening old mounds where burrow weathered nearly closed. At SE edge of Ward D, much death camas cut (photoed). In one area 50 × 20 yds., nearly all of about 100 seed stalks, 12"-16" high, cut. // Under 1' high boulder (1'×2'×2') a burrow dug several inches deep! // Another old burrow found plugged freshly. Opening (appar. old) had been about 1½' diam. Nearest used burrow 50' distant. // Head of slope (N. side) Ward D most of ward 5-8% S. slope. had few burrows on slopes >15%, & none currently used above this level. Farther uphill much *A. sm.* + *Andropogon*. // On Ward G, rocky area with [illegible] uphill

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& downhill, I saw 4 grown, & groups of 6, 1, & 1 juv. Doubtless more grown present. Activity extends to 40 yds. E. of pipe-stake put in by Cole. Slope 12-15% ~~of~~ on this ward. Large patches *Aristida* about 8" high on uphill side. Saw 1 juv. *Sylvilagus* here. It ran out of clump of 1½' tall mint & into old *C. l.* burrow, rather large in bore, & used appearing. Water erosion starting on this ward on denuded ground near *C. l.* holes (1 kodachrome taken). // Visited some other colonies in park. In near flat area W. of display sign in Norbeck Dam town, few *C. l.* & weeds on mounds growing vigorously, & much *A. sm.* in vicinity, but about 50% of ground bare in vertical view. ~~At~~ Mostly *Monolepis* on mds. on lower slope, but also *Lappula*, *Sphaeralcea*, & others. Patches of *Aristida* in area. About 100 yds. W. of sign much *Buchloë*, & on up slope. Sphaeralcea in bloom. *Erysimum* (yellow wallflower) cut, 1' tall, in flower, at several sites. // I paced off & marked with rocks a plot of about 2 A, ~~7~~ 234 x 450' paced, Cole's pipe-stake being at SE corner. Some *Chenopodium album* & *Artemisia frigida* cut. As compared to Shirttail town, vegetation (= soils) fairly uniform. Horned larks & meadow larks seen. One burrow 10" diam. plugged freshly 1' down hole. // Visited Rankin town, SW exposure in canyon bottom, 5-15% slope. Dominant veg. *Artemisia frigida* 10-12" high, with *Lappula* 6" high between. Saw a *Bison* rolling here; several dusting wallows present. *C. ls.* confined to *Art. frig.* island. Slopes around steeper, with *A. sm.*, *Andropogon*, & rocky. *Lappula* in flower. Much *Art. frig.* cut some sites, but no evidence decrease in it. Took photos. // At upper Sanctuary town, ground green due 1" high forbs. Population apparently high here, & at lower Sanctuary town (low at Rankin). Many burrows at bases 6" diam. posts - at bases half posts in 50 yd. stretch. SW exposure. *A. sm.* main grass. In area of thick 6" high

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Lappula - there are few burrows. In most area even spacing mounds is striking. Paced out & marked plot of about 2 A, 210 × 390 ft. (1 hr. later, overcast, counted only 5 grown in plot). At SW edge town, a few badger-bored in long past. Soil fine silt loam. Much buffalo sign. At edges where Art. frig., it is cut. Androp. scop. upslope from Art. frig. One formerly badgered burrow showed C.l. scratchings toward in su end direction. Slope E to W - 7%, S to N + 5%. Little grass on town. Few rocks. S. exposure. More A. sm., fewer forbs, on W. side of former fence; few burrows & no C.l. seen there. // Visited Highland town 2 p.m. Muggy, 8/10 overcast, warm. Counted only 6 grown, no juvs. All seen in area 100 yds. long, but 80 yds. E. of end this line a few used burrows & much cut Art. frig. Probably not over 10 grown C.l. present, & most burrows in area show no use. Away from used burr., forbs tall - Lappula 1', a blue trumpet (= Penstemon) 1', at S. corner. Fair amt. A. sm. Gen'ly same forbs as Shirttail. Much of short vervain (?) as at Sanctuary #2 (upper). I saw a black widow in web mouth old burrow. Schedonnardus more common than seen elsewhere. Little Buchloe except at E (downslope) part where few C.l. burrows. Euphorbia 1' tall, a 6" tall mint common, some Psoralea (2 species). Collected several plants. Yellow potentilla present, & Tradescantia (mostly grazed, but also grazed where no C.l.) A new burrow at base 6" high Symphoricarpos, where veg. short & bare ground 50%. Mounds had much Amaranthus; Solanum, Boebera (= Dyssodia papposa) (& on ground), others. Plantago purshii present. Up canyon a meadow of similar slope with very old C.l. burrows to 100 yds. W. of foot. 50 yds. farther on much Bromus & A. sm. Do C.l. decrease Bromus, or avoid it? // In main colony, farthest W. recently used burrow about 85 yds. short of head of meadow, about

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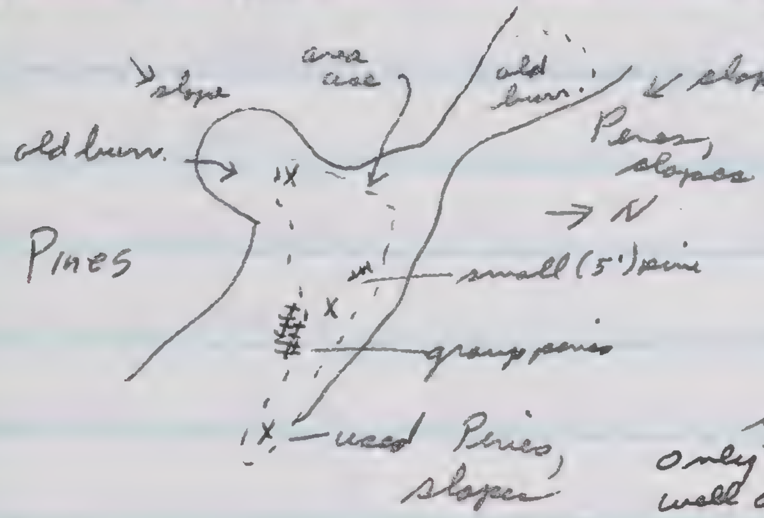
June 21, 1955 Wind Cave N.P., S. Dakota.

50 yds. E. of where marked pit by farthest used burrow in May. In th ~~[illegible]~~ In NE part, much *Opalia*. All activity in area about 3 A.



~~Prairie town~~

Sylvan town.

This town excellent for study entire population as isolated unit.

Only towns in park ~~that~~ are doing well are the Sanctuary towns (?).

June 22, 1955 Niobrara Co., Wyoming.

Driving S. toward Lusk on highway 85, saw one by roadside in region of Red Bird (near Mule Creek Junction).

N. Ft. Collins, Colo.

June 24, 1955 I visited Spring Canyon Dam colony. Much greener & grass taller than early this month. *C. l.* occupy about same area as before, & none of extreme border points (#21, 29, 31, 24). Apparent litters of 4 or 5 at or near #32 & 25. None seen near #18, where a litter earlier, & no recent scratchings there. Area N. of fence now has much *Salsola* to about 1 ft. tall. In NW 1/4 colony, many stalks of *Psoralea* have been cut. These 8-12" tall, cut a few inches from base. S. of fence less *Psoralea*, but occas. stalk cut. In areas of rather open stand *Ag. sm.*, many culms, & stalks & leaves, lying on ground. Standing grass shows that many culms have been pulled out. Apparently succulent tip eaten, rest cast aside. (Our pet "Herman does this, & witnessed at Wind Cave). *Buchloe* common in NW 1/4, & now has heads. *Bout. grac.* also headed, & about 8" tall seed stalks. *Lappula* present but rare. On mounds grow *Salsola*, *Sphaeralcea*, & a purple-flowered *Solanum* mainly. Much *Ag. sm.* in area #2 & 21, where apparently little *C. l.* activity now (10"-12" tall, no heads yet). Near #22 (where a *C. l.* seen), many

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blades + seed stalks *Bou. grac.* cut + left on ground - as many as 10/sq. ft. 10' N. of #19, many stalks *Bromus*, *Hordeum*, *Bou. grac.* cut + lying on ground. (Clipping increases vigor Büchloe, Bou. grac, *Ag. sm.*, + nearly all left on ground as litter, so effect grazing not as great as cattle/stalk eaten. *C. l.* increases litter. //A new burrow 8" deep 5 yds. NE of #19; under 5" diam. rock, in area 50% bare ground, + *Buchloe*, *Salsola*. Some small *Salsola* uprooted rather than cut. //Near N. center colony, much *Hordeum*, *Bromus* cut. Buchloë seed-stalks about 4" tall here. *Salsola* cut at some sites, 1/8" to 3/16" parts sometimes cut. On bed of dry pond, *Salsola* is 90% of vegetation. At periphery many stalks cut. At site where 6" tall, about 8 stalks per sq. ft. cut, 15/sq. ft. where thick + 10-12" tall. // Burrows on pond bed (#7, 36) show little use, but much *Salsola* cut there where 30% ground bare + little but *Salsola* present. // In NE 1/4, much *Salsola* 8" tall, but only 1 *C. l.* seen there. No evidence recent activity near #24 or N. of it. Much *Salsola* cut vicinity #8, 9, 10. Many stalks *A. sm.* cut + lying down. Where 8" tall, up to 15/sq. ft. 5 yds. W. of #10. *Buchloe* about 20% cover in this area. // S. of fence, relatively very little *Salsola*. Some grazing here this year (not N. of fence). About 90% *Buchloe*. Some *Sphaeralcea* in bloom. Lt + *Psoralea* not thick, but common. Many *Ag. sm.* culms pulled or stalks cut, + some *Bou. grac.* too. apparently little recent activity on slope on E. side, as no fresh scratchings, spider webs in burrows (black widows). //On steeper slope in S central part colony, more *Bou. grac.* (*Bu. da.* on flatter). Much *A. sm.* cut + left - this dry grass conspicuous on green, + allows determination area *C. l.* activity by inspection ground. //I made overlay of map showing limits activity + locations where *C. l.* seen.

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Juvs. large & not so readily distinguished from grown as at Wind Cave.

May 23, 1955 Addenda for TRNMP, Medora, N. Dakota.

Common on Johnson plateau a Lactuca, probably ludoviciana. In Government Creek area, a small mustard, Descurainia sophia, common on old Cyn. lud mds. (poisoned Aug. 1952), & also Monolepis nuttalliana. In grazed pasture, on (poisoned) mds. same area, where much Ag. sm. & Bo. grac., Cryptantha bradburiana common. Lepidium densiflorum common within park boundary, same area, on mounds, on 10% slope, where little grazing. Also on park area, old mds., much Sphaeralcea coccinea, Descurainia, Monolepis, Lepidium, & a pubescent Eriogonum a Chenopodium. On Big Plateau (May 22), another Lactuca (pulchella ?), common on mds. (rootstalk, perennial). Also same place, Bromus tectorum, grows vigorously edge C. l. mds. (+ Pogonomyrmex mds.). Much between mds. too (dominant at 10' distance). In Aureney bottom where ♀ shot May 25, Art. frig., Schedonnardus? (called a Poa at times), Plantago purshii, Sphaeralcea coc.

June 17, 1955 Addenda. Wind Cave N.P., S. Dak.

In Shirttail Canyon, main forbs on mounds still being used: Psoralea, Festuca octoflora, Tradescantia (in bloom, blue), Amaranthus, Lygodesmia, Solanum, Lappula. Some other plants present: Asclepias pumila, Echinacea angustifolia, Liatris (cut by C. l.), Plantago purshii, Festuca octoflora, Solanum, Oxalis, Schedonnardus, Calochortus (in bloom, white), + others collected.

Nr. Ft. Collins, Colo.

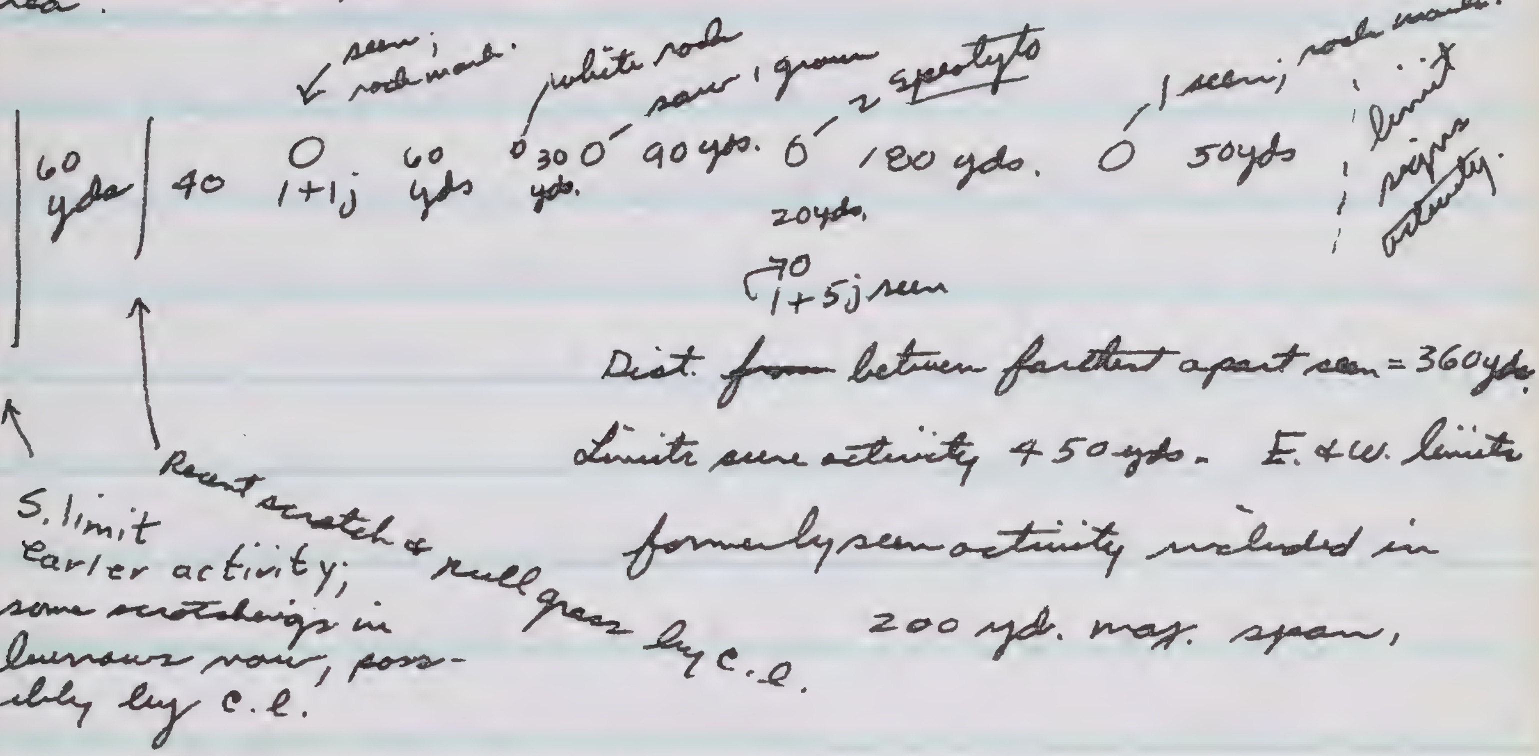
June 25, 1955 Visited Damp Colony, 5 S. 2 W. Ft. Collins in forenoon. Saw 4 grown, + groups 1 & 5 juvs. Gen'l maps of

Koford 155

Cynomys ludovicianus

June 25, 1955 No. Ft. Collins, Colo.

area: → N



60 yds
40
O 1+1j
seen; rock mark.
60 yds
O 30 yds.
white rock
O 90 yds.
saw 1 grown
O 2 Speotyto
180 yds.
20 yds.
70 1+5j seen
O
1 seen; rock mark.
50 yds
limit region activity
S. limit earlier activity; some scratchings in burrows now, possibly by C.l.
Recent scratch & cull grass by C.l.

Dist. ~~from~~ between farthest apart seen = 360 yds. Limits seen activity 450 yds. E. & W. limits formerly seen activity included in 200 yd. max. span,

Evidently this population has not congregated in small area, nor has productivity failed, as young produced. This is located in ~~with~~ large old colony, so deep burrows available in all directions beyond limits present use. All activity on slopes about 5%, only on SW facing slope today. No movement up slope on ENE side, where old burrows. Probably only move up-hill when crowded on lower (& more favorable, presumably) slopes. E. slope above colony principally green Salsola. Where C.l., about 50% of cover is Buchloe, now bearing heads. Bout. grac. more prominent on steeper slopes. On mds. principal plants Salsola, Lepidium, Chenopodium, a yellow daisy, a 4" tall mint, a purple flowered Solanum. Salsola tallest, about 12." Near burrows Salsola cut. (Cattle present & doubtless also cut it). ll at N. end colony for 100 yds., mainly Salsola, but weeds & Ag. sm. present, little Buchloe or Bou. grac. Scratchings & droppings to 50 yds. N. of where seen. Sphaeralcea, a white flowered Astragalus, Opuntia, in bloom; no evidence recent eating; Opuntia buds. Purple flowered Solanum vigorous in mouth one little used

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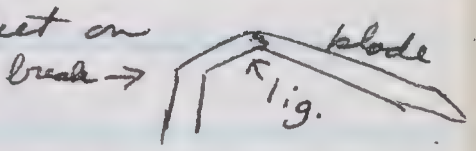
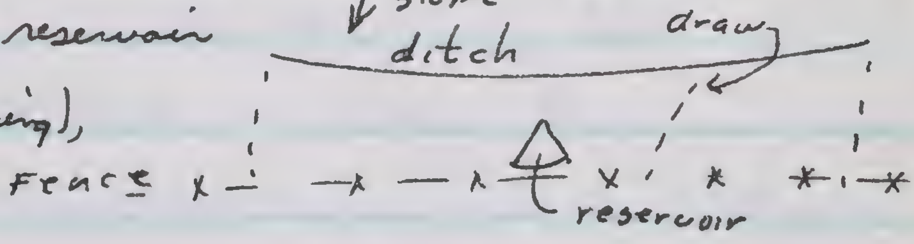
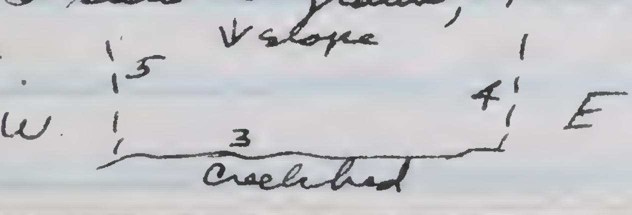
burrow. (*Speotyto* - rabbit fur, & pellet with insect parts & mouse fur; also feathers; on one mound). // Near where 5 juvs. seen, many culms *Ag. sm.* had been pulled & left lying on ground. More than 10/sq. ft. some sites where *A. sm.* was 1/3 of cover. In area juvs., 60% cover *Buchloe*, much *Salsola* present. // As often observed, burrow where 1 juv. seen is small & located 5 yds. from larger old mound (apparently second entrance). (The large md. here apparently spot where I trapped a *Speotyto* earlier this yr.). Near crater where juv. seen, much *Ag. sm.* pulled to 6' distance, as many as 15 culms/sq. ft. Recent scratchings at burrows to 40 yds. S. of where seen, & possible to 100 yds. (extreme limit where activity seen early this year). Where *A. sm.* culms pulled, sheath often broken partly about 1/2" below ligule, as if *C. l.* rested feet on



Visited then *Sec. 3* colony & counted dogs on previously marked off area of about 2 A on N. aspect slope. One count gave 6 grown 26 juvs., another 6 grown + 32 juvs. Overcast, & perhaps all not out. Possibly occas. shooting this area. Groups of juvs. numbered: 5, 8, 2, 1, 7, 1, 6, 2, from W. to E. Probably ~~littlers~~ litters readily mix in small area when crowded. Evidently very high productivity this slope (below irrigation ditch, partly above old small reservoir



On opposite slope (S. facing), where *Salsola* 6"-10" main cover, little grass, in area 250 yds. long by max. 150 wide (N & S), I saw 6 grown, 4 + 5 + 3 juvs., 1 *Sylvilagus*, 1 *Speotyto*.



Lower density & fewer juvs.; area about 5A.

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On this S. facing slope much *Iva axillaris* cut, out of all proportion to amt. present. In bottom many seedstalks of *Distichlis stricta* cut & left lying. Some *Gaura* & *Salsola* cut & left lying. Light horse grazing this pasture, & perhaps horses eat *Salsola*, but cut off stalk usually left on ground. *Salsola* cut 1 to 3" high, at angle; not obviously nibbled by rodents (some horse, some *C. l.*?). At mouths many burrows purple-flowered *Solanum* [illegible], & some *Salsola* too. // In census plot to S. of fence, on N. slope, *Ag. sm.* sparse but widespread, & many culms pulled some sites. *Iva* stubs stalks cut at 1 to 3" height, as many as 15/sq. ft. 10" tall *Euphorbia* (*marginata*?). Some *Dyssodia* present. *Monolepis* on a near mounds. Small patches *Buchloe* present, heavily grazed, stolons prominent. Soil a clay loam. Some *Bout. grac.* present; seed stalks to 4" tall, with heads. Many dry culms of *Ag. sm.* on ground. Nr. W. end, *Chrysothamnus* much cut with cuttings left. Not cut in adjoining area to W. where no *C. l.*, nor *Salsola* (so *C. l.* rather than horses?). To W. where no *C. l.*, *Bout. grac.* seedstalks 1' tall & clumps *Ag. sm.* large. Uncut *Chrysothamnus* 4' tall. *Salsola* 10", uncut. Found skull of baby *C. l.* on mound. Much 1½' tall *Psoralea* cut at 2"-6"; probably by *C. l.*

CPER, Weld Co., Colo.

June 26, 1955 Visited CPER Sec. 22 colony. Green now, especially because of *Salsola*. *Opuntia* (yellow pear, pink barrel), *Lappula*, *Oenothera*, *Sphaeralcea*, in bloom; heads on *Buchloe* & *Bou. grac.*. Many juvs. now present. At least 20 new burrows in area N. of creek bed at W. end colony, invading 4±% S. slope where much bare (60%) ground, *Muhl. torr.*, *Salsola*, *Chenopodium*. I staked all new burrows

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June 26, 1955 Weld Co., Colo

I found N of fence (marked 6/26, + approx. depth hole if shallow). Some at base closely cropped Chrysothamnus. At least 3 in area low ant mds. Depths of some: 6", 8, 12, 12, 6, 6, 20, 24+, 24+, 24+, 16, 16; These N. of 22W + 24W. Apparently recent invasion this area. High water in bottom may have caused movement; some stakes in bottom obviously had been heavily water washed, + E. exclosure washed by wat., Salsola, + other debris (exclosure taken out). Farthest N about 140 yds N. of 22W, this one a well developed mound + deep burrow. Photoed many new holes. // Picked up coyote droppings at 22W, + 00W.; sound. // In group N. of 24W (new holes), 7 staked. These lie in arc, about 20 yds. apart, farthest being 125 yds. bearing 322° from 22W. // When 2 juvs. in NA', active small Pogonomyrmex md. close to burrow. Inside W. exclosure, no cutting Salsola within borders were exclosure. Recent repair work in burrow, ch. N. of 20W. // A few recent + shallow to N. of PA'; farthest being 82 yds. bearing 322° from 30W 2N stake. ~~One Farthest N about 8" deep over 2' One 2+ ft. deep in rocklike hard clay (mound); another Kept N. 8" deep. Both These when ground 50% bare, tho Carex, Buchloe, Muhl. torr. present. Another 10" deep.~~ ~~Farthest~~ in old low ant md. + 10" deep. Then 26 yds. S. to one 10" deep, then S. to one 2+' deep, then one 8" deep in rocklike-clay. At least 50% bare ground here, some Buchloe, Muhl. torr., Carex present, slope est. 4%. Salsola to 10" tall. Longest jump 45 yds. between holes. // In the group of new holes N. of KA'; 6 staked; 1st. 30 yds. from nearest, + last 48 yds; others 13-20 yds. apart. Evidently these are for refuge when invading new feeding area. Farthest N. mound the best developed one. // Another line of 3 new to N. of 18W, the farthest apart 26 yds, all shallow. // In SW1/4 of EB', one burrow about 10" deep

Cynomys ludovicianus

June 26, 1955. Weld Co., Colo.

had been dug out to diam. about 10" to near end, probably by badger or coyote. Skull & remains carcass, still having soft meat but little hair, lay on mound. Much ant activity, these appear. having low mound there at burrow site. No other sign invasion or fresh digging by C. l. here. Apparently new area of shallow burrows does allow easy predation! In this zone (where burrow & a C. l. seen earlier this year) vegetation ~~taller~~ + [illegible] covers more ground than in invaded area to W. of it. // In N part of CA'; new burrow 24+" deep under small ant md.; no other near. I staked all recent burrows found N. of E-W fence (about 24). // Water in bottom ditches about 10' wide (e.g. at ~~8w~~ 2W, ~~10s~~ 20S). One possible set C. l. tracks in mud near water. // E. of E. fence, burrow formerly staked as farthest E. is still ~~farthest~~ (in C'M). One in bottom must have been inundated but shows apparent recent scratchings. An extension to S. of streambed just E. of fence, however, to about 30 S 1 E. I made overlay map showing details & locations events.

June 27, 1955 Nr. Ft. Collins, Colo.

About 4 p.m. I visited Sec. 4 colony 6 mi. S, 2 W., of town, where C. l. in barley field (formerly thought wheat). In the 100 yd. wide field on S. side of creekbed I saw 5 grown, & at one burrow (~~20~~ 10 yds. downslope into field on uphill side) 6 large juvs. One grown one at burrow 40 yds. into field. // W. half of this long strip has been ploughed; grass (grain) very sparse there & about 3" high, & Salsola at some spots to 6". Heavy rains since ploughing. Many burrows there have been repaired by C. l. since rains. These mainly within 20 yds. of downslope (N) edge, but some near center. I saw no C. l. here. Grass sparse - ave. 1 stalk / 2□'. So some persist there after ploughed, but maybe recently abandoned.

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One adult ran from barley field to burrow 10 yds. upslope from uphill edge. One near the 6 juvs. ran 40 yds. to another burrow, where another grown one, in edge plow barley. //Eating barley, green. Hundreds of stalks cut off, now lying on ground. Many of these were culms with basal end eaten below node, sometimes stopping at node, usually stopping below it. Cut usually at 1-3" height. A few perhaps pulled out of sheath, most cut thru from outside. At upper edge barley field was belt *Salsola* about 8" tall, & many stalks of this cut. A milkweed (*Asclepias*) about 1 ft. tall there uncut (milk weeds & *Euphorbia* not cut because of bitter milk?). //At site 10' from a burrow where wheat 10" tall, much cut, up to 10 stalks/sq. ft. Many stalks cut only until fall, not clear thru, as if cut to reduce high vegetation, not for food. No livestock here to confuse picture. Stalks not cut where no *C. l.* burrows. // Near burrows ground not denuded, but barley in open stand & about 8" max. height. Many cut stalks have heads, but seed poorly developed & little apparent nutriment in, & heads or seeds not eaten. Many oats (*Avena*) mixed with barley, sometimes ½ of stand, & this too cut where tall (to 18"). At one burrow not currently used, tho used early this year, barley so vigorous that the spot attracted my attention. On one md., grew thickly & 20" tall, while sparse & 6" to 16" tall at distance 3'. In patches where barley thickest, tall & closely spaced, none cut. Where tall but open stand, cut by *C. l.* // Visited field on N. side of valley, where grain now sparse & about 4" tall, planted (or just ploughed) about 1 month ago. Within 20 yds. of downslope edge, bordering unploughed ground, many burrows had been opened &

Clyde Doren, USFS
Herbicides
Grand Mesa

Benzene hexachloride

Cynomys ludovicianus

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had scratchings, apparently used. I saw one C. l. in burrow 10 yds into ploughed field. About 6 burr./A. at edge, where formerly many before ploughing. No seen diggings by C. l. for seeds of plants, & little evidence feeding on them found (feed on unploughed?). Farthest into of ploughed field was 100' in. Ploughing merely a corrugation, water washed & smoothed, not a ~~jump~~ jumble of large clods, so would not hinder locomotion C. l. Near 2 old mounds at top of slope, 100+ yds. from nearest edge field, a little scuffing of soil, possibly by occas. C. l. visit, but no repair of burrows. Grain 4" tall. // On unploughed bottom, most ground now covered with Salsola 10" tall, deep green (eat in pref. grain?).

June 28, 1955   Denver, Colo.

Talked with Mr. Welch about using herbicides to discourage rodents. He loaned me report of herbicide work in relation to Thomomys on Grand Mesa, Clyde Dowe of USFS, Denver, should also have info on this. For discouraging C. l. from using old burrows on steep slope or other site, Welch recommended spraying burrows with diesel oil, (This had been used to discourage Thomomys, ploughing it into soil). Benzene hexachloride had also been used, on surface, to discourage rodents; Welch lent me some for trial. This has been used on top of ground to discourage rodents; it lasts ~~3 m~~ about 3 mos. atop ground.

June 30, 1955.   Montrose, Colo.

Talked with Ben Crandall, Fish & Wildlife predator & rodent control man, & with Walt Doering, his assistant. In their region there were 3 forms of Cynomys - gunnisoni, leucurus, & l. zuniensis. The last was most difficult to poison & was common now in area

Cynomys ludovicianus

June 30, 1955 Montrose, Colo.

NW of Cortez in area of about 12 townships. These apparently do not eat grain that has poison (~~as~~ 1080), tho they eat up unpoisoned bait, colored or not. Apparently the dogs can detect poison. (V. Scheffer suggests that, as in humans, certain inds can taste ~~poison~~ some substances, others cannot, in a genetic ratio, & ~~that those that can taste it might survive~~). Crandall & Doering both verified the decreasing effectiveness of any poison when long used. Crandall here since 1938, Doering 1942. After 3-4 seasons, poison poor effect. A near 100% kill was made in Delta County on leucurus colony last (or this?) year, but this unusual, & reason unknown. Poisoning effectiveness varies with season, early effectiveness high (30-40%, April-June), then poor to about July 20, then better until fall. Young come out about time lilacs bloom, said Doering, usually May 15 to early June, all 3 forms having young about same time. Periods hibernation differ in length & time of year. Gunnison hibernates longest, white-tailed shortest. Doering said leucurus little active midday, especially when dry wind, but much early morning & late afternoon. He thinks they eat much cheatgrass & are often found where this Bromus occurs. Wellington, Colo

~~June~~ July ~~2~~ 4, 1955. At 7:43 a.m. arrived at Wellington preserve. Warm, clear, calm. ~~At~~ No evidence of expansion of colony to N., most likely direction, beyond staked burrows. In fact, some staked show no use. Few seen near N. edge. In many areas green Kochia especially thick & tall on edges mounds & for several inches around them, where burrow little used (same with shrub), about 8-10" tall at mound, 2-3" in surrounding area. To N. of inhabited area open stand Atriplex canescens 2-3' high. In years of high population

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July 4, 1955 Nr. Wellington, Colo.

pressure this area might be invaded. I made 3 counts of grown + juv. C. l. in census area of about 2 A. Highest count 34, 9 or 10 being non-juvs. A Sylvilagus + Speotyto + Citellus 13-lineatus on same plot. Largest group juvs. at 1 burrow is 8, with 1 adult, at burrow where 2 grown trapped on my last visit here. This might be composite group, some having lost parent. Otherwise no groups juvs. > 4 or 5. A dove + meadow lark fed on colony. Cover on census plot mainly Kochia, 3-6" tall. Gutierrezia prominent on S. part, about 8" high, + in some clumps these stalks are cut (~~8~~ 1/4 stalks cut in some tufts). At N. end Atriplex in low scrubby bases with little foliage, C. l. apparently having kept it down. ~~Some~~ many green shoots (6-8" long) of Atriplex cut + left lying. Apparently more cut than of Gutierrezia. A few clumps of Opuntia present, but no current eating. Winterfat (Eurotia) apparently kept down to tufts about 2-3" tall by C. l. where many of them, but little present. C. l. scratch under edges base many bushes, perhaps to make shady spot. This may aid erosion + expose some roots. "Charlie" came up close to me as if to be fed. Dogs appeared not too alert, perhaps because of warm weather, but ~~moder~~ not thin. Some seen to eat green Kochia, cutting a pulling up near base, then chewing basal end cut part + discarding most of it. // In area exclosure, ~~protected~~ area had taller vegetation than surrounding. This especially due to seed bearing growth of Eriogonum (much cut outside exclosure), + partly to somewhat taller plants of Kochia, Salsola. Winterfat no taller inside than outside. // Site where Gutierrezia (possibly Chrysothamnus nauseosus) 25% of cover, 10" tall, 1/5 of stalks some bushes cut. // No new burrows noted, but one started

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July 4, 1955 Nr. Wellington, Colo.

in old mound where no hole. // In horse pasture 6 acres, counted 32, 12 ~~(or 14) be~~ (or 10) being non-juvs. Largest group juvs. was 5 (at one burrow) or 6. No new large litters seen. Probably some dogs not out. One seen at SW extremity colony. Little activity in NE sector where 90%+ bare ground. At least two pair Speotyto present (pellets ~~of~~ on 2 mounds had beetle & other insect parts, gray mouse fur, mouse bones). Evidently green Distichlis being eaten, many stalks (to 4/sq. ft.) cut at base & left lying on ground. One seen eating Kochia. No expansion colony, but nearly all former area occupied. Two seen in old barley field to S. of E. part colony, to 40 yds. from fence, where Kochia but not in tall sparse barley. Overlay map made & annotated. Milkweed ~~now~~ 2' tall & in pink blossom. Evidently C. l. do not cut this, perhaps because of milk (also Euphorbia). The rough leaved Iva axillaris common & ~~some~~ much cut in some areas. In general, feeding where Kochia or Distichlis fairly thick, perhaps most succulent; is moisture critical in hot season? 10 mi. N. Waverly, Colo.

July 6, 1955 Visited Sec. 13 near Rudy Ackerman's about 7:30 a.m. No prairie dogs where I took 2 (the only ones) early this year. Saw 1 Sylvilagus & 1 Speotyto at C. l. burrows. Ground cover short but fairly complete, of Buchloe, Muhlenbergia, Schedonnardus. Arrived Sec. 23 colony 7:45 a.m. 1/10 cumulus, light breeze, warm. About 500 ft. E. of the gully (10' high sides, 40 yd. wide sand & gravel bottom) I saw 2 grown C. l. at mounds 50 yds. apart. None seen here on previous trips, tho old burrows present there. These mounds at edge

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July 6, 1955 N. of Waverly, Larimer Co., Colo.

of slightly lower flat area where water had stood, & which had good growth of short Bouteloua gracilis. Near mounds 80% bare ground, some Eurotia & Ag. smithii. || None in about 2 A. where prickly poppy dominant & many Pogonomyrmex mounds, slope ~~1-2%~~ estimated 2%. None in area of Atriplex can. 1½' tall, bushes 10' apart, Salsola dominant between, but much bare ground. Here & at many sites in other parts colony, apparent Cynomys diggings 2-3-4" deep. Near diggings Bouteloua seedstalks 10-12" tall not cut. Water had stood here (reason no C. l.?). Diggings up to 4/sq. yd. 2/3 of 12" shoots of one Atriplex bush cut. Opuntia in flower but not eaten. This Atriplex area about 6 A at SE po. edge colony. Total colony about 120 A. estimated. In evening S. slope up to 5%, in area of at least 10 acres, only 12 C. l. seen. General aspect 70% bare (actually more) || In one area about 2 A. near S. fence near shallow swale, 3/acre seen, including juvs. (3 or 4). In this area much cutting Atriplex & moderate amount of a purple-flowered Astragalus, especially seed bearing stalk about 1 ft. high. In swale much Iva axillaris & Ag. sm. ~~Burrows occupied~~ C. l. seen were 50± yds. from swale. Much A. sm. cut down & left on ground. Burrows on gravelly loam on higher ground near swale (evidence standing water, mud). Near this site, To S. of fence none seen; there Atripl. 1½-2', & all ground had been muddy. Many shallow diggings in nearly barren soil, & husks of Allium left at site. At least 20 such diggings in half an acre. Some holes to 6" deep. Little evidence live stock, tho a few old footprints cattle in mud. No new droppings cattle seen. Nor any carnivore scats! || At W. edge

Cynomys ludovicianus

July 6, 1955 N. of Waverly, Larimer Co., Colo.

of gully at E. side colony, a few new burrows & much of some Atriplex bushes cut to or within 20' or even less of edge. In gen'l, Eurotia 8" tall uncut where Atriplex cut (for food? rather than reduction height). // Many diggings for onions where sparse Ag. sm., Atriplex, Eurotia. Diggings to 4/sq. meter. 90% bare gravelly ground. // Some new burrows under or alongside low Atriplex bush. Saw a young Lepus townsendi run from under edge Atriplex bush; later saw adult on colony. Burrows mainly from 10 to 22 yards apart, farther when a swale intervenes. Burrow spacing seems fairly constant regardless of population density & sparsity of forage. // In swale, Ag. sm. & Astragalus cut. Seed of Ag. sm. not well formed, & not eaten, it seemed. Part one prickly pear leaf recently eaten (by C. l.?). // Farther W. along S. fence another concentration (of 7 in est. 2 A) near a shallow swale, & 2 seen S. of fence (where Atriplex 2' tall). Much Ag. sm. cut in swale, but not Poa. Little Sphaeralcea present. Much Allium diggings 5 yds. from uncut Ag. sm. heads. // S. of SW corner of fenced section there are C. l., where old burrows, & much fresh digging at mounds. Soil rocky, of clay shale pieces. 90% bare, 7% slope to E. at most. One litter of 4 seen 70 yds. SW of corner. (Not over 2 or 3 juvs. noted elsewhere in colony; ~~poor~~ was low litter size?). Cover here Eurotia, mostly, Salsola, Ag. sm., Eriogonum; ~~somewhat~~ notably more cover than N. of fence. Shale pieces in mounds to 2" across. Farthest S. apparently used burrow was 200 yds. SSE of fence corner, habitat there being Atriplex 3-6' apart, 1-1½' high, mainly Salsola (+Ag. sm., Poa) between (80% bare between shrubs) (this relatively poor for C. l.?). Apparent Dipodomys burrows near

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July 6, 1955. N. of Waverly, Colorado

these peripheral C. l. burrows. No shallow peripheral burrows found. // Gen'l: expansion of colony may depend on population in relation to carrying capacity, not to on certain absolute no. of C. l. // In swale up to 4/sq. ft. of cut down seedstalks of Ag. sm., where mixed with green Salsola, 70% ground bare. // In central area of town, a long raised portion running S. from hill, Eurotia dominant (2-4' apart, 4" tall), 90% ground bare, some Ag. sm.; but few burrows & C. l. (far from lower damper drains?); & few food diggings. // Yellow flowered Eriogonum flower stalks cut & left, leaves not cut, at 3-5" above ground, all 3 main stalks cut, & another cut likewise, both within 5' from burrow. // In NW part colony, new burrow 6" deep at base Atriplex with cut tops; Two other new near base yucca plants. Another new 10" deep in shale slope, slabs to 3"x4"x3/16". // It seemed that when overcast, hot, & humid, relatively few C. l. out. No carnivore sign & no rat snakes seen. (Predator control sign on corner post). Atriplex may be eaten as principally base of new growth eaten, the base being about 10" above ground. // At ~~the~~ S. edge of N. hill, activity on 7% slope, & many Atriplex cuttings. // About 3/A for several ~~acres~~ on E. slope (5%) in NE part colony where Eurotia dominant, 6" tall, 5-10' between. Sparse Ag. sm., Sphaeralcea, low Chrysothamnus, between, & 90% bare ground. // In general Eurotia not cut, but at 1 site most of of a clump cut. Yellow Eriogonum also cut. In swale much Salsola to 8" high, but apparently not cut. ~~Most~~ Burrows seem to be often located on slopes leading out of swale. New burrow 10" deep in this NE part. In one area 50' diam, Atriplex bushes 3 to

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July 6, 1955 N. of Waverly, Colorado.

6 ft. apart, & every bush had ½ to ⅔ of shoots cut & lying there on shrubs. Found a large juv. dead on mound. No evidence shooting or eating by carnivores. Nr. Ft. Collins, Colo.

July 7, 1955 at Spring Canyon Dam colony from 10-11:30 a.m. Counted 17, 6 being juvs. (perhaps not all out). Two seen at S. + W. extreme locations where seen early this year on occasions (as if recent spreading). Limits activity apparent from plants cut (same N & S. of fence, tho no grazing to N.). Made overlay map showing limits & locations C. l. seen. Population scattered still. No new shallow burrows apparent (old available). At NW part, many seed stalks (12") Bout. grac. cut - to 8/sq. ft. - & lying on ground. Salsola, Psoralea also cut. Yellowish area on slopes around dry pond due mainly to drying Buchloe (heads present, stalks 3-4" tall, none seen cut). NW section has been reinhabited, apparently, since my trapping. In N central part, Bromus, Hordeum, also cut, but apparently not Aristida. These grasses in patches, not large solid stands. Saw a baby Sylvilagus enter old C. l. hole at edge dry pond (a pile of Xanthium burrs just outside entrance, Salsola cut adjacent). Patches of Salsola of a few sq. ft. almost completely cut down in N central part. No evidence activity N. of # 24; fairly solid 4" Salsola that sector. S. of E-W fence, activity on slope of E. side only to about 5% grade. One seen at S. pt. of colony, limit of where any seen early this year, & possibly digging of burrows to S. of this [yes - now there] (on reverse slope). One seen also at central W. extremity, where a Sylvilagus once trapped where C. l. seen.

July 9 1956. Took photos cut plants at Spring Can. Dam colony.

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July 8, 1955 Nr. Ft. Collins, Colo.

Saw one, recent diggings, & cuttings on rocky high pt. just N. fence in ~~south~~ center colony. Carnivore (dog?) dropping found on one mound. Salsola chief plant growing vigorously on little used mounds. // Visited Sumps colony 11 a.m. Saw 6 grown, 1 with 3 juvs., 1 ~~with~~ with 1 juv. One Speotyto at burrow (where seen before; feathers, droppings), & 1 Sylvilagus. No C.l. seen in SE or NW 100 yds. colony, tho cuttings Salsola + diggings at burrow there. The 6 + 5 juvs. in area estim. 6A. Clear, warm, light breeze. Activity evidence to farthest burrows (SE, NW) formerly seen used. In gen'l many cuttings Salsola about 10" high, where ground 50% bare, some Ag. smithii, occas. patches Buchloe. Overall effect on Salsola probably slight. Old burrows on W facing slope not used, to about 15% slope. Thin pop.; no pressure to expand up slope? Rocky mound, fresh, had rocks to 170 gms. wt. (Spring Can. Dam).

July 9, 1955 NE Larimer Co., Colo.

With Don Hervey, Range Mgt., Colo. A+M, visited 3 colonies. At Sec. 23 colony, 10 mi. N. Waverly, noted much Atriplex cut but little Eurotia. Don said range would be considered "depleted" without doubt. No evidence recent grazing there. At Sec. 10 colony, much more grass cover, & good forage species present, but much bare ground too. Probably would rate poor, or low fair. Here much Eurotia cut (where little Atriplex); both it + Atriplex cut where both shrubs. Chrysothamnus present both colonies, new growth about 8" high, but none seen cut. A ~~the~~ Chenopodium cut at one site. Sand dropseed & Oryzopsis present but rare. In short grass plains, differences in range with use are subtle, & a great change occurs only when goes to poor. Little litter because of wind. At one site

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July 9, 1955. Larimer Co., Colo.

where edge of crater mound broken out, scratchings to 6' distant on that side only, apparently to repair damage, & much *Muhl. torr.* torn ups in process. Browse plants may be as important as weeds to prairie dogs, thinks Don. // We visited Wellington colony. Green *Kochia* apparently favorite food(?) as much cut. *Distichlis* apparently cut in small amt, & one burrow in it with trail thru about 5 yds. 5" tall rather thick *Distichlis*. On horse pasture, one apparently new burrow was 35' out in *Distichlis* toward *Typha*, where *Distichlis* not too thick, & some sedge (△ x-sect) about 1½' tall near site cut, possibly by *C. l.* On colony Don thought *C. l.* fairly surely keeping the *Atriplex* & *Chrysothamnus* to a few inches height (tho perhaps did not originally reduce height shrubs), & keeping *Kochia* from growing tall (no tall old growth where ~~*Kochia*~~ *C. l.* thick). Apparently little grain now being fed ~~to t.~~ to birds on area. At fence line to horse pasture, very little difference in composition & coverage vegetation on 2 sides, tho much less browse in horse pasture. // Don told me that Sand Dropseed grass has greenery inside base all year, thus possibility for winter food. *Psoralea*, ~~eaten~~ cut by *C. l.*, not eaten by livestock.

July 10, 1955 To Wind Cave, S. Dakota

About 7 mi. N. of Red Bird, N. of Lusk, *Wyo.*, saw apparent 3 in green bottom to E. of highway 85. Arrived Shirttail Canyon late afternoon. First impressions: ~~dog town~~ all solid bright green with forbs, so appearance lawn-like. *Bromus* headed out now & dry-appearing. On Ward B & some other sites, stickseed (*Lappula*) dry, &

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(shirttail Can.).

July 10, 1955 Wind Cave N.P., S. Dakota

tiny burrs a nuisance (socks, clothes). Many mounds in use had good crop forbs. In SE Ward D, ad. & juv. at isolated gp. burrows in Bromus, as before. Ward D all green, Chenopodium areas pale green. At 7 p.m., 15 seen on Ward A (slightly ~~54~~ (50') more included to S.), 5 or + being juvs. Sun then set, & few C. l. out at 7:15 p.m. Warm Hot day. Patches of Aristida now conspicuously red & headed out. Ward A, Chenop. alb. much cut, but to 6" tall, & Boebera = Dys. papp. (little before) now common, 3-5" tall. // To S. of Ward A Bromus thick & 12"+ high. Occasional old burrow found in it, with little modif. veg. ~~around~~ near (concealed by grass). A few old large mounds, 6' diam., bare with tall Bromus starting at edge mound. Festuca octofl. now brown. Much Bromus cut near some burrows. // Idea - is present veg. on C. l. town cause or effect? in terms suitability for C. l., it ~~is both~~ conditions for cause & effect are same. // Ward B apparently has 6 grown C. l., no juvs. // Area X, an invasion spot SW of Ward A, has tall brome on 3 sides. On E. side C. l. path goes out thru moderately dense Bromus to burrow (old, used) 5 yds. distant, then thru 10 yds. thick brome, 16" tall, to an old md. & clearing (12' diam.). Some cutting Bromus along the way. Area W, farthest W. invasion Ward A, has no activity, weeds growing tall. Area 30' X 30'. // At one site where much Sphaeralcea in bloom, much of it cut by C. l.; & many seed stalks Plantago purshii cut another site where 8" tall. Schedonnardus vigorous, with long seed stalks (go out, little up) apparently not cut near same site.

July 11, 1955 Counted Ward A at 6:45 a.m. 8 grown + 7 juvs., juvs. in groups of 5 (where seen 3 weeks ago) + 2. No new invasions evident on Ward A. // 7:46 a.m., at S. tip of Ward C; ~~8~~ 7 grown seen, no juvs. in used area about 1 acre, square. One eating ~~Argemone his.~~ Cirsium lucs.,

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8± " long, cutting at base, standing & eating at base, sometimes discarding after 3 or 4 bites. At least 3 leaves eaten this way in 2 min. at close range I saw another pulling culms Ag. smithii, grasping firmly at base with teeth, pulling out (of sheath ?), eating tip, discarding. Evidently conditions for feeding excellent in this vanguard of Ward C! // In area X, 8 a.m., 2 grown + 2 juvs. (as last mo?). Area Z, 3 grown + 2 juvs., as last mo. In area Y, 1 grown (where I trapped a juv. last mo.). To S + SW of Ward A, 12 grown + 7 juvs. (poor count). // S. end Ward C', of Cirsium plant 5 leaves cut (about 1/3 remained on grd.), but 12± still on plant. Some Argemone to 1' tall in vicinity not cut! At one site Artemisia gnaphalodes 6" tall, & a broad-leafed mint 4" tall, were cut. At S. end, much Ag. sm. cut. I picked up 20 dry cut stalks in one handgrasp (wind accum. ?). Where much Sphaeralcea, much cut (in flower; eaten ?). Badger burrow - spiderweb covered now; so site of feeding, not den? Apparently C. l. has little effect in keeping down Lappula except next to mounds. Where Bromus on bottom thinned, Lappula increased greatly, & Ag. sm. dominant grass. // At another site on C', 15 leaves Cirsium cut at base, leaves to 8" high above ground, in area 2 ~~ft~~ sq. ft. Again, 3 head or flower bearing stalks 1-1½' tall cut in area 2 sq. ft. A mustard also much cut where present, to 2' tall - (has seeds, not flowers now). Where dogs border tall Bromus, much cut at edge stand brome. // Herman, pet baby prairie dog, has molt line ~~over~~ across back behind shoulders, new hair on posterior back moving forward. We have a canvas vest for Herman & a thong attached to this acts as leash. Herman at first opportunity started to dig under rocks of our old fireplace, in an old C. l. burrow. Within about 2 min. he broke thru into the hole below. Later

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he dug at depression in an old mound, where hole not visible, & was out of sight 2 min. later. Digs with 6± strong alternate strokes forepaws, then shoves soil back with 4± strong strokes of hindfeet. Sometimes pushed or carried soil out cradled in forearms. When tied in pine-needle area on hot day, he dug a depression & lay in it, as if to keep cool. When hears other *C. l.* do jump-bark, he stands high on hindfeet, but does not answer. He does jump-bark when someone comes after a long absence, as if for a greeting or sign of recognition. His sight seems poor, for often he must touch a morsel of food before finding it (in house, where somewhat dark) Can climb wire, as of cage, but not sure footed at height, for when on table or shoulder he often falls off & thumps to floor. When hot he drinks water from dish or puddle.

July 12, 1955 Les Albee told me that near Ludlow, S. Dak. (nr. N. Dak. line), was prairie dog town having albino dogs (Ralph Jacobi, owner, lives 3 mi. S., 1 mi. E. of town). // With Les Albee visited several towns. Rankin town. Albee thinks *C. l.* has had little effect in relation presence or absence of *Artemisia frigida*, as more than half vid of plants left by *C. l.* Of weeds present: a *Solanum* with 1/2" diam. green "tomato" common, *Astragalus crassicarpus* present, *Hedeoma* very common (also on Shirttail, Ward A, & Rankin), *Verbena bracteosa* common (seedlings thick; plant large on *C. l.* mds. *Art. frig.* usually indicator overgrazing; indicates dry shallow soil. "Increaser" in cattle grazing. At edges, (sides canyon) *Art. frig.* disappears, *Andropogon*'s come in (big bluestem spreads by rootstocks, little b. not). Saw herd 40± bison

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here & several patches bare ground 5 yds. diam. where they dust (*C. l.* mds. ~~is~~ some). Town in wide canyon bottom, sloping S. about 5%. *Lygodesmia* in flower. At downstream end, somewhat damper (?), so little *C. l.* activity, some *Carex penn.*, *Bout. grac.* (seedstalks), *Ag. sm.*, & about 5% sageworts (*Art. frig.* & *gnaph.*). *Ag. sm.* seedstalks 2' high cut by *C. l.* Much *Amaranthus* (2 ~~large~~ kinds; *retroflexus* common). *Andropogon* grows on slopes, not lower flats; decreases under grazing. // Upper Sanctuary town had herd buffalo cows (+ calves) on it, several dusting wallows. Solid bright green, due mainly to *Hedeoma*, *Verbena bracteosa* seedlings, amaranths, *Dyssodia*. In low spot some *Bout. grac.* Few perennials on main part town (what eat winter ?). One area thick *Lappula*, now drying, 6" tall, not kept down by *C. l.* At edges town *Art. frig.* cut, then on slopes 1 ft. tall & uncut. Les thought evidence indicated elimination *Art. frig.* by *C. l.* on flat. *Andropogon* also started on slope where *Art. frig.* tall & thick. *Ag. sm.* present but very sparse over colony. On some wallows & bare ground *C. l.* mds., *Portulaca* (annual succulent), but not apparently eaten. Saw black widow in *C. l.* hole. // Sylvan town. Some juvs. now (at least 4) & about 6 grown, in area seen before (except not in E. portion, where no fresh cuttings *Art. frig.*). 1/2 acre dry *Lappula* 6" tall. On mds. usual: *Verbena bracteosa*, *Amaranthus retroflexus*, *Dyssodia papposa*, *Ag. sm.* (18" rhizomes?). Rather fresh badger hole at S. edge town, & several apparent old badger holes; ~~in *C.l.*~~. On unused mound, *Art. frig.*, 2 amaranths, ~~Lyg~~ *Lygod.*, *Plantago*, *Hedeoma*, *Verbena bract.*, *Euphorbia*. Cut *Art. frig.* to 50' uphill of SW edge burrows. *Amaranthus retroflexus* chief plant on mounds. Parts of town had nearly solid *Schedonnardus*, perhaps indicator of more recent disturbance of ground. More

N. Amer. Prairie
J. E. Weaver
Johnson Publ. Co., Lincoln, Neb.

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than noted any other site. Ratibida (an increaser) also present. Les said that denuded ground took 15-60 yrs. to recover native perennial grass vegetation, coming back faster on heavy soils (Ag. sm. one of first to return, favored by heavy soil).

July 13, 1955 7/10 cover, calm, 6 a.m., & all dogs evidently not out yet. About 14 antelope on ward ~~B~~ D, in bottom, apparently resting there. With Les Albee studied range in relation C.l. in Shirttail Canyon & ran line transect where John King ran one in 1948. Stalkless bull thistles do not nec. indicate C.l. effect, for have no stalk first year. General on mds.: annuals & rhizomatous perennials. Les says few dogs in Butte Co. where a dark shale ~~salt~~ soil. He has hunted C.l. 20 years for sport & has never seen a ferret. // In same areas sheep grazing knocks out Bout. grac. rapidly. Maybe C.l. do to, as little on towns as compared Ag. sm. Bout. grac. has seed reprod. primarily. Little Stipa in dog towns, or sedges; these are green early. Hedeoma very common on town but not invader of mds, it appears. On line transect, areas 10-20' across of Buchloe encountered, tho [error probably] King did not mention this species on his line. Amaranthus retroflexus & Verbena bracteosa grow very large & spreading on C.l. mounds, as compared to elsewhere. In one area where much Bromus jap. cut, much Ag. sm. left standing as if less cut. Even Hedeoma cut at edge one esp. thick stand. Ag. sm. plants especially many stalked, as compared to ~~where~~ other areas with which Les familiar - effect of C.l. clipping? Fairly complete elim. grasses in areas apparently occupied only a year or two surprised Les. Plantago common on ward B is spinulosa; the common Lappula is ~~hispida~~ redowskii, common Hedeoma is hispida.

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Les Albee remarked that Bromus japonicus & Agropyron smithii on
dog towns was many stemmed + spreading, rather atypical of the
plants. Ag. sm. has about finished growth for season. // We put
in a line transect through area x, farthest SW invaded spot of
Ward A, going into thick brome on each end of 160 ft. line. This
will give info on former state Bromus if C.l. spread. Line along
contour, about 6% slope to SE. Little grass, much bare ground, &
little litter in center; more litter + grass toward Bromus. // Bison
Flats town visited with Les. Seedstalks of Asm, Bja, Sco cut.
Bgr in poor shape, all rather dry compared to Shorttail. On SCS con-
dition ratings, best of bottom near older part town (200 yds. N. of
dam) would rate close to 60% (= low good), most only 45% (high
fair). Asm is increaser, so not counted above certain amt.
In bottom Plantago spinulosa cut or pulled out at base, as if root
eaten. Up to 5/sq. ft. on ground. Old mounds wide -10'- ~~but~~
only about 1½' high. Stiff goldenrod also cut. Sedge, green early in
season, might then be used by C.l. Forbs here amt. to about 20%
of annual forage production. Art. graph. & ~~cane~~ high protein fall;
~~to~~ grasses high protein when production low. Liatris punctata
has large root; C.l. might eat. In draw where Ag. sm. 18-24"
high, ~~rather~~ not thick, much cut by C.l. Bromus - much with
seeds missing as if eaten, especially close to burrows (10' out).
On whole, forage production about 50% (of capability site), a "low good."
// Norbeck Dam town. Burrows (mounds) near road marked by dried
up brown weed (= Amaranthus graecizans), conspicuous in
surrounding green at distance. Few dogs within 100 yds. behind
(W. of) sign (display) on flatter ground (snow lay longer? or lack

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winter food (plenty now). Area near ft. slope, where many C.l., post-use condition about 45% (as Bison Flats), tho B.out. grac. less. //On Upper Sanctuary town, on 70×140 pace plot, I've listed plants as follows:

Grasses:

Ag. sm. 5%

Carex penn.

Arist. fend.

Eragrostis cil ~~(A)~~ canensus (A)

Schedonnardus

Panicum capillare (A)

Ann. forbs:

Hedeoma

Plantago

Portulaca

Euphorbia

Dyssodia

Verbena bract. 90%

Solanum

Amaranthus retroflexus ~~graecizans~~ ~~retrof.~~

" graecizans ~~blitoides~~

Salvia

Oxalis

Lappula redowskii

Physalis

Amsinckia

Perennial forbs:

Art. frig.

Potentilla

Gaura coc.

Psoralea tenuif.

Solanum

Sphaeralcea

Tradescantia

Rosa

Aster

Total 1%

These are based on amt. foliage produced annually. Intend to use this to compare with stomach contents. On this area also many grasshoppers. A large Chenopodium (leptophyllum?) eaten from top next to burrow, as if by C.l. In one area many dry A.sm. tufts lying on ground as if pulled up by C.l. An area of Andropogon 10± yds. from C.l. burrows (below it on slope), but C.l. apparently had not invaded it.

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July 15, 1955 Devils Tower, Wyoming

On dog town here, many more perennial forbs than on Shirt tail town, it seemed. Les Albee told me that an area of mixed prairie in S. Dakota, deliberate overgrazing by cattle for many years, & resultant vegetation mostly *Buchloe*, with some *Agsm.* & other grasses, but *no* *forbs*. The stand of *Aristida longiseta* now on dog town here was more than Les had ever seen in S. Dakota. Chief plant on mounds here: *Polygonum aviculare*; others *Amaranthus blitoides* & *graecizans*, *Solanum triflorum*, *Ambrosia artemisiaefolia*, *Erigeron canadense*, *Plantago spinulosa*, *Salsola kali-tenuiflora*, of annual forbs; *Lygodesmia*, *Melilotus*, *Oenothera*, *Solidago rigidum*, *Sphaeralcea coccinea*, of perennial forbs. Many kinds of taller plants cut: conspicuously *Brassica juncea*, to ½" diam. & 3' high, which sometimes grows next to mounds. Seedstalks *Plantago purshii* cut much some sites, & *P. spinulosa*. At E. end much cutting of *Symphoricarpos* & *Artemisia cana*. Much *Art. gnaphalodes* cut several sites. One area much cutting next to a peninsula of *Euphorbia* 12" tall, but little of ~~that~~ that cut, (account juice?). Fruits of *Astragalus bisulcatus* & others apparently not eaten, tho succulent. At one site at W. end, 2-3' tall *Helianthus* felled.

Shirttail C., Wind Cave N.P., S. Dakota

July 14, 1955 I trapped an old ♀ about 100 yds. W. of SW corner of King's original Ward A, where I had seen juvs. Measures 388, 82, 59, 800 gms. (Stom. & contents 50, caec. & cont. 45). No molt in progress. Tip 30 mm. tail is bare. Vulva imperf., light gray. Ut. horns 80 x 2, mesov. mod. fat, judged parous. No external fat. This apparently one marked by King in 1952 or earlier: toes clipped: LF \\\|+, RF 0, LH \X\|+, RH \\\|+/. Stom. cont. saved; only 15% green,

Koford

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July 16, 1955 Devil's Tower, Wyo.

I saw 2 eating heads of green but drying Bromus tectorum; at some sites brome much trampled down to in 5 yd. radius around burrow. // At NW edge colony I had put stake at limit apparent activity last month. Now there were a few new burrows to WSW of that, downslope, to 80 yds. distant; apparently new invasion. Invaded area has about 50% bare gnd. (vertical view), but many good forage grasses, & some water erosion (one burrow near (20' from) head of gully). Plants at site farthest burrow: Stipa comata Andropogon scoparius, Agropyron smithii, Bromus tectorum, Aristida longiseta, Asclepias pumila, 1 yucca, 2 Opuntia polyacantha, Applopappus, phlox, Artemisia frigida, & some others. This md. 3' diam, 6" thick, loose red sandy loam, as if new. Yucca 16" high 5' from; about 15 of lower leaves cut at base. Another new burrow 20 yds. E. of this one at downslope edge 8" high brome; downslope from that little brome but Asclepias pumila, Ag. sm.; Bout. grac. // On low ridge where farthest NW staked, one dug out as if by badger (dried apparent stomach or caecal ~~contents~~ left in a ball). 30' NW of it, downslope, new burrow where bare ground, Bout. curtipendula (in seed), Bromus. 50 yds. SW of one on ridge, much 16" tall Art. frig. cut in area Bromus. As apparent activity & modif. veg. to 80 yds. from former end of colony, burrows ƀ 10-40 yds. apart. Farthest out one had much Ag. sm. cut near. Another had much cut Stipa comata near. // In gen'l, where colony, ~~abuts~~ kept to area thick & extensive Arist. longis. N of road (S. slope), no further invasion into Aristida (or thick Bromus), tho both have their spots with forbs (~~Asclepias pumila~~ Allionia, Sphaeralcea).

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Even in rather thick continuous *Aristida*, used & old burrows & mds., with forbs, at distances to 20 yds. from other burrows. // The 2-3' high mustard (*Brassica hirta* ?) is much cut by *C. l.*, all of it cut in some areas, mostly just felled with tops lying on ground, but sometimes tops missing (eaten ?). In area 100 sq. ft., 20 may be cut down, & none over 1' high left where many *C. l.* This is now most conspicuous weed felled. // I saw one eating dry plant of a mustard with O shaped transparent thin pods. Another apparently ate *Amaranthus graecizans* that grew next to mound (green). // At E. end colony much cutting at top steep ~~blank~~ bank dropping 10 (vertical) to terrace near river, & *C. l.* have heavily cut *Symphoricarpos occidentalis* (1-2' tall) here. A patch of *Artemisia gnaphalodes* also cut (8'×8', all cut, 12-16" tall; about 4 cut/sq. ft., only upright stalks cut (so not cut to eat ?). *Brassica* cut as high as 1' above ground. // Surely a lull in no. dogs above ground in midday (dry mod. wind), & increase about 4:30 p.m. Some *C. l.* bodies seen - apparently killed on road. Fed *C. l.* near road very fat now. Some juvs. can be hand fed, but generally more wary than adults. No more than 4 juvs. seen any one spot. Entire colony area occupied, tho probably thin in areas *Aristida* thick. This especially thick (continuous sod) in area between logging road & river in NE 1/2 colony, & above road in NW part colony. In between, in census area especially, mostly *Buchloe* in nice short lawn with few forbs (eventual vegetation here ?). This *Buchloe* sod torn up to bare ground near many burrows,

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in bands extending about 6' out. Where brome 8" tall & thick, much trampled down by dogs near burrows, & poorly defined run-ways thru it.

July 17, 1955 Mod. SE wind, clear, at 7:30 a.m. Counted dogs in census area #1. Total all = 48, from 20 to 28 being juvs. This result of several counts. At 8:30 a.m, 21 grown + 18 juvs., so apparently some juvs. went in. This in 2¼ A. bordering road (see map). In census area #2, 24 counted 8 a.m., about 3/4 being juvs, at 8:45 a.m. In area where much *Aristida longiseta* in SW part colony, 14 counted in about 8 A, 28 in about 12 A. *Aristida* not solid, but with green areas of forbs. Where little but *Aristida*, about 1 dog / A. // On colony to S. of road I saw a few magpies, + 3 *Citellus leinaster*. One *C*-*13*-l. also seen in NW part colony, N. of road. // On slope to NW of road opposite census area #1, I counted 15 out at 8:30 a.m., but probably more present. At head of this area much *Aristida*, a swale having less had *C. l.* upslope to where slope steepened much. Most of census area #1, for space 150 yds. in NW-SE direction, crossing logging road, was mostly *Buchloe dactyloides*. *Hedeoma hispida* & *Plantago spinulosa* grew up thru this. Of the latter, much apparently pulled up including short root, & base gone on some (eat root?). // I saw 3 clearly eating green heads of *Bromus tectorum*; this grass also much cut. Three others clearly eating *Hedeoma hispida*, apparently taking seeds from cut-off plant stalk held in paws. // In the census plot #2, *Aristida* dominant in N. 1/4. In rest *Plantago purshii* dominant, tho *Brassica hirta* tallest by far. Also present in *Astragalus*, *Artemisia gnaphalodes*, *Sphaeralcea coccinea*, 7 or tant.

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July 17, 1955. Devil's Tower, Wyoming

ant mounds (bare 8' diam. there). // In 6x6' exclosure: ~~ab~~ *Plantago purshii* 20%, *Lepidium* 20%, *Aristida* ~~20~~ 15%, *Gypsophila* 10%, *Hedeoma* 5%, *Sphaeralcea* 5%, *Amsinckia* = Cryptantha? 20%, *Ambrosia* (A) 1%, *Applopappus* 1%, & some (<1%) *Ag. sm.*, *Bromus*, *Erigeron*, *Lappula*, *Allionia albida*, & at least 3 other forbs. // ~~So~~ Both kinds plantago cut. // On mounds noted: ~~A~~ plants marked on separate list. // In census plot #1, thick *Bromus* at SW end, then *Aristida*; center & NE mostly *Buchloe*, patches *Aristida*, scattered *Hedeoma*, *Sphaeralcea*. // On a hillslope, about 20%, *Lygodesmia* 16" tall cut to 20' upslope from nearest burrow. // At E. side, no spread on terrace near river. Some *Melilotus* (tall) cut there, & *Symphoricarpos occidentalis*. ~~A~~ On E. part town on main terrace, toward river, now mainly *Aristida*, with *Hedeoma*, *Gypsophila*, *Asclepias pumila*, occas. small (6' across) patches *Buchloe*. (Don Hervey believes *Aristida* favored where water penetration better, *Buchloe* on slightly heavier soil). At SE edge of main terrace, where 15' drops to river bank area, few burrows within 20 yds. edge. *Bromus* & *Stipa comata* nearer edge. In SE part colony, *Amsinckia*?, *Gypsophila*, now dry & dead. // No further extension burrows to SW beyond fence, apparently because of very thick growth of *Bromus tectorum* there. ~~Chenophyl~~ *Chenopodium leptophyllum* cut (green) at some sites near mounds. // Counted all burrows in census plot #1, about 2 1/4 A, not counting those < 6' from counted. With few exceptions, all appeared to be used & deep. Total 225, or about 100/A. This where population maximal for long time. Along a ditch at SW end plot, 1½' deep, 3 burrows on SW side ditch bank within 8 yd. distance. *Ag. sm.*, *Arist. long.* growing at top bank. Illustrates that a break in vegetation, or slope & soil,

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favors burrows. In open stand hardwoods in below ~~be~~ drop in slope near S end colony, some burrows, not currently used, near base of large trees, ~~O.~~ within 1-3' of trunk base. Two near base of 1' diam. ash trees under 10' diam. canopy. Illustrates ~~that~~ next to colony, atypical ~~unfavorable~~ sites used for burrows. Not typical because not suitable food? Burrow in rocky red soil; one rock 3"x 4"x ½". Some yucca leaves cut from several tufts near burrows (photoed). // In thin stand Andropogon gerardi, many stalks cut. (In areas ~~to~~ Andro. scop. on S. slope, much bare ground but few forbs, few C. l. burrows). // In only extension found, at NW end colony, N of road, max. distance between burrows 35 yds.

low ridge → ~~o~~ old swale ← N

. — farthest W.

. // I made step-point (1" loop) census of plants in area 40' on each side of farthest burrow, to show kind of ground invaded + amt. bare ground. Root crown plants taken. More than ½ of loop litter = litter hit, < ½ loop litter = bare ground. Of 100 pts., 38 bare ground, 30 litter; grasses, present, with hits: Ag. sm., An. scop. 8, And. ger. 0, Aristida lo. 0, Stipa co. 0, Bo. grac. 4, Bout. curtip. 12, Buchloe dac. 1, unrecognized grasses 3, . Yucca, Opuntia poly, Art. frig. present. Forbs: Psoralea, Lygodesmia, Asclepias pumila, Phlox 1, ~~C.~~ Solanum, Erigeron canadense, other forbs 1; Carex 1. No rock or gravel. Est. 5% SE slope. Red loam soil. Uphill much Bromus. Plant density index = ~~68~~ 32 only. Grasses 28, ~~[illegible]~~ sedges 1, forbs ~~2~~ 3. // NE Niobrara Co., Wyoming. 3 mi. SSW of Mule Creek Junction, noted a Cynomys colony to E. of highway 85. It extended from fence to about ¼ mile W., + from a bottom S. upslope about 300 yds. Yellow flatten-

Niobrara Co. colony:

Little variety forbs compared Devil's Tower, Wind Cave.

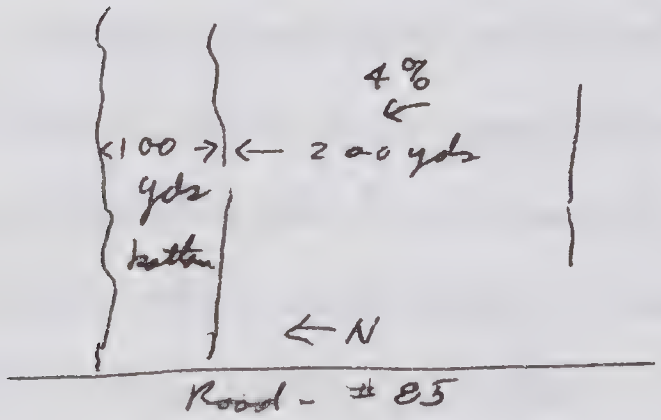
Occas. patches Amsinckia (?)

Grass 3" tall, grama heads to 8".

Dead Chenop. (graecizans?) on mds., ~~A~~

~~A~~ Schedonnardus, Yucca present.

Phlox present



No mds. among hedged Artem. trid., but shoots cut.

Bottom - much B. gr., some A. sm., B. da., Aristida.

Some A. sm. on mds.

A sm cut (heads), 2/sq. ft. for 100 sq. ft.

Sph. cocc. - nearly leafless some mds. (C. l. or sheep cut?)

Chenop. lepto. some mds.

Lupine (browsed) present.

Applopappus (some) on slope.

Astragalus - some cut.

Top slope (to S), 88% cover.

Lepidium densif., Parmelia present.

To S of crest, more Art. trid., burrows rare.

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July ~~18~~ 17, 1955 Niobrara Co., Wyoming

ed oats on ground indicated recent poisoning, but I saw 15 dogs out on estimated 4 acres, & several near bottom. This primarily sheep pasture, as shown by tracks & droppings. At head (S. end) of long 3-4% slope, mainly Carex (filifolia?), but Bout. gracilis mixed with ~~further~~ halfway down slope (+ much Plantago spinulosa), & much in bottom. Patches Buchloe also in bottom. On break in slope (steeper) near bottom, open stand along Artemisia tridentata. C.l. had apparently cut many shoots of this. A few lupine plants cropped low, but no tops present so maybe not C.l. I found one dead C.l. atop ground. Both molted except molt incomplete in shoulder region. Much open ground between grass & sedge tufts. Silt loam soil, 50% bare. On mds. Solanum triflorum, Sphaeralcea, Salsola, & other familiar plants. In thickest green grass in bottom, no C.l. mounds or sign. Some Ag. sm. present, & some Stipa comata. Main slope of colony about 5%, N. aspect. Over low crest were a few burrows. One had tufts of Stipa co. persisting on mound. Should photo this next trip. Much low Opuntia on this colony but no evidence recent feeding on it found. Some Agropyron smithii ~~(sp.?)~~ & another mid-grass (Poa) present.

July 19, 1955 CPER, Weld Co., Colo.

Arrived 12 M. at CPER Sec. 22 colony. Clear, dry, 20 mph S. wind. From W. end colony I saw 4 N. of fence at W. end, 22 in 10x10 chain sector 10-20 W, 0 to 10 c. S. Much Salsola cut throughout colony, & for 50' S. of southernmost new burrows (10-20 W, 10-12 S.). W. exclosure clearly shows that it is C.l. ~~that~~ cut Salsola. Rarely over 10" tall in cattle exclosure, many stalks over 20" tall inside exclosure (photoed). One new burrow about 25' NW of 30 W, 2 N, with ~~many~~ much grassed sod scratched onto mound. In that area, much Bgr cut to

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~~July 20, 1955 Rocky Mtn. Nat'l Park, Colo. ground squirrels, Eutamias, Richardson ground squirrels all present in area park & town.~~

CPER, Weld Co., Colo.

July 21, 1955 Arrived at CPER colony about 10 a.m. to continue mapping & observing effects of C. l. ~~In NW portion, much~~ Much Portulaca, a spreading succulent, ~~near water~~ in bottoms but apparently not eaten. Bout. grac. seedstalks cut at many sites, allowing determination of limits feeding activity. In quadrats P C', -B', -A', cut to about 20 yds. ~~up 50~~ up 5% E. slope from recently dug burrows. Of recent burrows (May, June) N. of fence, some dug no deeper, others dug much deeper than 6/26. Depths & mound sizes (diam., thickness) noted on overlay maps made. Salsola principal forb cut, but Chenop. ~~al~~ lepto. also much cut, & some Amaranthus retroflexus, Ag. smithii cut where tall, & even Juncus in wet bottoms (at edge where stand thin). About 20 stalks Juncus cut / sq. yd. some sites. On flattish bottom throughout colony, where Bout. grac. about 90% of vegetation, much of it cut (seed stalks). (Klipple says seedlings rare & seed crop poor, so perhaps little effective loss seed due to C. l.). In quadrat L A, some cutting throughout patch of Salsola to about 18" tall in mod. dense stand - about 3' between large plants, & Chenop. lepto., Lappula, Bout. grac., & other herbs mixed. Cleome & Cirsium 2 - 3' tall & conspicuous because not cut (taste? stickers?) tho adjacent forbs cut. One depressed burrow, showing use, located at base 3' tall uncut Cleome. Gutierrezia & Chrysothamnus about 8" tall & uncut tho green. At one spot (in PA') Allium dug up & root (tuber) eaten. No Speotyto or Crotalus seen, but Sylvilagus common. I flushed 2 from

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25 yds. N. of N. burrow. One recent ~~former~~ burrow staked early July, in N. pt. of PB', had large md., 6' wide × 8" thick, of rocky soil. Some others of staked burrows much deeper than when staked. About 40 kinds of plants present within limits of town. Specimens collected. Many same as at Devil's Tower & Wind Cave. Juncus 1' tall in wet sinks of bottom. Open small ponds near 20 W, 0 N. Cheno. lepts. often cut. Cleome in flower, Sphaeralcea flowers mostly gone.

~~July~~ See next p., 190.

July 21, 1955 CPER, Weld Co., Colo. p. 191.
(Sylv.)

under pieces tin on colony, saw 3 in C. l. burrows or run into them. Apparently some are juvs. A fledgling (lark bunting ?) seen, in shade of fencepost. No ~~hor~~ hawks, eagles, or fresh carnivore droppings seen. In MA apparent badger digging, rather fresh, near known old burrow. // A few new recent burrows discovered (such as 2 r in PA'), but possibly present 6/26 & not noted. No further extension to N at W. end; ~~a farthest N. burrows (o~~ extreme N. burrows showed no sign recent activity, but next to S. did (PC', RC'). Some old burrows opened (Pb n, in OB', now used). In NA', a well developed mound & burrow near old (early May) one next to ant md. (this used too). Several sunken or depressed old burrows in bottom, where certainly flooded earlier in summer, now show signs use (scratch, droppings). Example shallow burrow enlarged: PC', r 2 was 10" on 6/26, now 36"+. But r 1 no deeper than 6/26.

Custer, S. Dakota

July 23, 1955

Talked with George Barnes, F & Wildlife predator & rodent control man for this area (N. of Custer), & visiting official Harold Haecker of Mitchell (see p. 192)

(cont. from bottom p.189)

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July 23, 1955 Custer, S. Dakota.

headquarters. The latter claimed to have compiled records of ferrets similar to those published by Cahalane (Jour. Mamm., 1954). Both said that 7 mi. NW of Kadoka, on Bill Norton place, once a small colony dogs with a ferret. The ferret was said by Norton to have cleaned out the dogs. Barnes said still about a section of C. l. in Badlands Nat'l Monument in Sage Creek area, N. side of pass. In this region a large town that would be poisoned was E. of Hermosa, 17 miles on N. fk. of road, on John Reed place. In a few days a small one 3 mi. N. of Fairburn would be poisoned (Williams). Harold said that tannic acid containing plants sometimes caused failure of strychnine poisoning of rodents (antidote) thru "interference." Few ~~par~~ prairie dogs left in this region now (poisoning in "cleanup work"), but more in Pennington Co. Harold had worked about 10 yrs. in "control" in this ~~state~~ region He said he had not noticed any diminished effect of poison on prairie dogs. Both men very friendly, but Barnes inclined to be over authoritative (said there were 2 kinds burrowing owls, for example). // Mr. Klipple said many weeds at CPER this year. This characteristic of wet year following a dry one. How does increase weeds affect C. l.? = more food? or more obstacles to cut. // Idea: get C. Hart Merriam notes for Llano Estocado prairie dogs. for evaluation (see Yrbook Agr., 1901). Have ferret stomachs been examined? What contained? Wind Cave N. P., Hot Springs, S. Dak.

July 24, 1955 Shirttail Canyon. On Ward B at least 6 dogs (no juvs.), probably 7, 2 being at far W end, 2 at E. end, + 3 near middle. I watched one eating Hedeoma hispida. Cut at base or pulled up with teeth, then held + ate from base. about ½ plant eaten. Seeds very tiny. Plants dry or nearly so now. Ate several, 1 after the other. In that area much Chenopodium leptophyllum cut + drying, + same thru much of ward B, where C. lc.

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July 24, 1955 Wind Cave N.P., S. Dakota

is thick (5"-6" tall). On mds., many tips Amaranthus blitoides & Solanum triflorum missing (C. l. cut?). //A. sm. present center Ward B, about 8" tall, sometimes ave. 3 tufts/sq. ft. Apparently not eliminated by C. l. Near another burrow, center of B, about 1/2 of Cheno. lepto. cut to 10 yds. distance all around. Aristida fendleriana – one C. l. picked & ate seeds, 1 by 1, fast. Also a single B. ja. tuft stripped of seeds (green). In solitary small Aristida ~~tufts~~, about half of culms cut near base, presumably by C. l. Schedonnardus ~~+ L.~~, Dyssodia, & perhaps Lappula (now dry) not eaten, it seems, nor Verbena bracteosa. //About 7 a.m., 6 Antilocapra rested on Ward F. A C. l. fed 20 yds. distant. At least 9 C. l. on that ward. //Ward B, 8 a.m. Hedeoma & Plantago spin. in irregular patches (due soil?). One mound had recent repairs with scratching to + into bare soil to 6' distance. Here Cheno. lepto. scratched out from dense stand. Ward B, little evidence cutting of Ag. sm. (much on parts Ward A). Where Cheno. lepto. 10" tall, up to 3/4 of plants cut down by C. l. In small patch Opuntia, A. sm. tall (16"); at edge tuft, culms pulled & sheaths broken in C. l. manner on seed stalks. //Where trapped 2 ♀♀ last visit here (1 released, 1 examined), ~~rece~~ fresh repair of burrow (in D e on King's grid). // Dyssodia papposa, Asclepias pumila in flower. //Much A sm ~~as~~ not cut where much Cheno. lepto. cut (little Hedeoma cut except some sites; pulled up too). //At E. end Ward B, Dys. pap. 90% of vegetation, but apparently none cut (5" tall, strong smell). //Art. frig. cut to edge terrace, 20 yds. E. of peripheral burrows; Ward B. Same area much Andropogon scoparius in open stand, & some tall stems cut at base. //One repairing mound scratched dirt toward it with hindfeet, then turned & pushed dirt forward with forelegs, finally tamped damp soil with his head. //Brome grass now mostly brown, & conspicuous,

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July 24, 1955 Wind Cave N.P., S. Dak.

In Ward C' there is area of bottom about 100 yds. long of B. ja.; then about 2 A. of green with C. l. (6 grown counted) at S. end (edge colony). This Brome thin in spots, not a strong barrier to C. l. At 8:30 a.m., 9/10 overcast, 5 seen in 1948 Ward A area (only 1 juv. apparently), but 3 grown just W. of it, + 2 juvs. 50 yds. to S. In area S. & W. of old Ward A I counted 23, approx. 11 being juvs. (These areas, old Ward A, & 1950 expansion area, are separately mapped). ~~Lat~~ // Brome + A. sm. tall (10") in Opuntia clumps; due to protection from elements rather than C. l.? // ~~Two crows~~ a crow seen on ground in colony, Ward A, + a dove. // At edge B. ja., much of it cut. Old burrows opened in edge of B. ja. mounds nearly covered with cut stalks. // In the 3 apparent bison wallows on Ward A, Dys. papp. now main cover. // Some mounds that King mapped 1948 now still rather small, about 6" thick. Some in 1950 invasion area now equally large. Ward B mds. are about 1 ft. thick + 6' diam. (larger ones). // An old (mapped) burrow in NE part of quadrat I k (King, 1955, p. 56) freshly dug out as if by badger. // In area X, where 160' transect line laid by Allen & Koford, much cut B. ja. scattered, + seeds stripped from standing stalks (isolated plants). A. sm. also cut, & many culms pulled from sheaths. Much Sphaeralcea cut in W. extension of Ward A. // No reinvasion area W. // Took Ekta photos, 35 mm., on Wards A + B.

July 25, 1955 At 6 a.m. warm, still, 2/10 overcast. Counted dogs on King's 1948 Ward A. Decided 8 grown dogs there. In quadrat I e, ~~about~~ 5 juvs., + some visited edge of Ward A. Another gp. of 3 juvs in I b, S. of Ward A. There seemed only juvs. E of line G/H (King map, p. 56). In rest of King 1950 invasion area (King, 1955, p. 58), 11 grown & 3 juvs. (doubtless not all out) counted. In area S. of Ward A, ~~about 4 or~~ 3 grown. So, S. of Ward A 3 grown + 8 juvs., ~~[illegible]~~, in all invasion area (S + SW + W), 14 grown + 11 juvs.

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at least. June counts better as pups. more readily distinguished. In area X, 2 ad. seen; area Y, 1 grown seen; area Z, 4 dogs seen (~~these~~ ~~not~~ evidently not all out; min. counts). // In general, where slope steepens near edges dog colonies in Shot-tail, ground rocky with scattered boulders sev'l inches diameter, & *Andropogon scoparius* dominant grass (usually *Carex*, *Art. frig.*, & other plants, in open stand). // Mapped vegetation, especially edge of *Bromus* on Ward A & parts of extension to SW. // In area Y, 150 yds. S. of edge 1948 Ward A, 4 prominent mds. in arc, ave. 6 yds. apart (close in isolated invaded areas? as much food? also close in area X). This area essentially without Bja for 30'X70' space, but Bja thin some adjoint spots, & feeding area probably mostly in ~~thin~~ areas Bja thin, not equally around burrows. Heavy cutting of Bja in low *Opuntia* patch. Much Afr cut in adjoining Carex-Bgr area 5 yds. W. of edge area Y (see map veg.). Old burrows also in that clearing. In area Y, Asm present in tufts ave. 1/2 ft. apart, to 8" tall (no heads yet). More Asm there by far (3X?) than in Bja stand. One grown *C. l.* seen here today, closest others 70 yds. to N. // Area X has 22 burrows in 100'X100' area (see map veg.). Isolated plants Bja 1' tall remain, but most stripped of ~~seeds~~ heads & leaves. *Amaranthus retroflexus* + *blitoides* grow side by side at edge mound. Many *Erysimum* plants, but few with flower stalk (some first yr.?). Present in clearing: Psor. ten., Sphaer. coc., Sol. trifl., Hed. hisp., Potentilla, Euphorbia, Art. frig., Dys. pap., Bgr, Asm, Verb. hastata, Schedonnardus, Ratibida, & others (see transect data). // Found near site King blind a sunken metal trap, now partly covered with soil, & on soil grew: Sched. pa., Verb. bract., Dys. pap., Am. blit., Solan. trifl. – ~~some plants~~ all plants favored by *C. l.* activity too, apparently. Principal plant on mds. here is *Am. blitoides* which spreads low & wide (1'+ diam.) on mounds. // Badger thought –

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if works most at periphery + isolated invasion areas, tends to prevent spread more than working throughout colony. Area W, isolated; 1 badger dug hole = short story? // At Custer, S. Dakota, talked with George Barnes, & Harold Haecker, of Mitchell, about prairie dogs, ferrets, badgers, coyotes, control. Accompanied them to dog town of about 60 A., 3 mi. N. of Fairburn, Custer Co., to poison C. l. there. Barnes said that, using 1080, many die about arm's length into burrow, few on top of ground. With strychnine, many die atop ground. //Barnes said ~~that~~ S. of Scottsbluff, Neb., many C. l. until at least 1946. Many large mounds there (sandy soil?). Sometimes F & WL Service rodent control man stationed there. Between Philip & Midland are also large mounds, said Barnes, perhaps due to past C. l. activity. Barnes said that near Smithwick, Fall River Co., he had seen where C. l. had cut "cane" (= milo maize?). // Fairburn C. l. town had been there since at least 1948 or '49 (Barnes). Gorsuch had not allowed poisoning C. l. but shot them with rifle. Another man (Rasmussen?) now running place. Poisoning work done free by F & WL Service (follow-ups of earlier control program). Colony about 60 A., about 1/4 in bottom where there was a barley field, partly harvested (by pd?) the rest dry. C. l. throughout barley & had apparently cut much at height 2-5," so looked like mowed short. One area 40 yds. x 40 yds. entirely cut out, at edge field. Surrounding area gently rolling hills covered with lawn like growth Buchloe & Bgr, about 2"-3" tall, with little space between tufts. Small amt. mid-grasses present (Asm + another), but only about 1%, & many seed stalks (8") of these cut. Mid-grasses dry, short grasses drying, so aspect yellow-green. Burrows most numerous in rounded draws & bases of hills. Few burrows on slopes > 10% grade. Boulders protruded

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July 25, 1955. Nr. Fairburn, Custer Co., S. Dak.

(not numerous) on these slopes. *Carex* on steeper slopes. Some *Art. frig.* Dogs had worked up slopes around field & spread over gentle slope atop steeper slopes. Peripheral burrows on flatter upper terrace had small mds. Largest mds. near bottom, where apparently damper. In + at edges barley field was *Kochia* (green), *Polygonum*, *Amaranthus retroflexus*, *Cheno. lepto.*, *Portulaca* (?), *Salsola* (green). Barley now dry, much standing still, apparently poor crop. Around mounds the *Bda*-*Bgr* turf dug out to 6' distance & 4" deep into soil at some sites. One bared ground grew *Sphaer. cocc.*, *Salsola*, *Amar. blat.* & *retrofl.*, *Dys. pap.*, spiny (= rostratum) *Solanum* (as CPER), *Psoral. ten.*, *Verb. bract.*, *Salsola*, *Applopappus*, *Hed. hisp.* Some *Bout. curtip.* in pasture. Probably small amt mid-grasses would keep below "good" pasture condition (SCS ratings) tho ground cover nearly continuous. Saw at least 10 *Speotyto*, + 2 *Lepus townsendi*. Number of *C. l.* here probably not over 2/A. // Barnes said that from about May 20 - June 20 juvs. do not eat grain, so adults killed by poison but juvs. not, yet juvs. survive without adults. Sometimes control work followed up by gassing burrows with a gas cartridge (chloropicrin?) dropped in & hole covered. Barnes said occasionally smoke ~~causes~~ comes out another hole as much as 75 yds. distant. // We used whole oats colored yellow to poison *C. l.* Walked around carrying canvas sacks (strap over shoulder) with about 10 lbs. grain. Used special "spoon" that held about 2 tblespoons grain & tossed on ground near burrow. No check of effect or follow up poisoning would be done here. // Harold Hascher told me of localities where *C. l.* in Mitchell-Huron region, east of Missouri R., ± ~~where~~ Forestburg (Sanborn Co., 1930±), Hitchcock (Beadle Co.), Artesian (Sanborn Co.), DeSmet (8 mi. SE, report this year, Kingsbury Co.). This is grain & corn country.

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9 a.m., Ward B, Shorttail Can., saw 7; 2 at 1 burrow W. end, 2 at one E. end. One stood atop 8" high boulder as if to look. Ward F, about 8 only; one feeds at upslope edge colony (fairly steep). Ward D, census plot, counted 18; 5 or + juvs., 10 being in E. 1/3 of area, 3 near spot of pure *Chenopodium leptophyllum*, 2 at upslope edge. One group juvs. at site where seen (marked) in June. // Another site where juvs seen in June, at SE corner Ward D, shows no evidence recent use by *C. l.* At W end Ward B, Art. frig. cut but not 10" *Koeleria* seedstalks (grew later?). Some *Artemisia gnaphalodes* cut same area. // Black widow spider with 2-3 eggcases seen in several unused burrows. // Ward D census plot vegetation mainly forbs; est. 80% *Verbena bracteosa*; others *Chenop. lepto.*, *Dyssodia pap.*, *Munroa squarrosa*, *Sphaeralcea* (N part); also *Euphorbia* (N. part, steeper), *Asclepias pumila*, *Solanum triflorum*, *Aristida fendler* (little), *Schedonnardus*. No clear gradation vegetation toward edges; mainly bordered by areas *Andropogon scoparius* // On mounds Dys. pap., Chen. lepto., Verb. bract., Sol. trifl. One dog seen eating green *Dys. papposa*, holding cut plant, eating base stem. Where Chenop. lepto. thick, 50% cut for several square yds. // In general, toward edge colony Bout. grac. + Ag. smithii increase, usually latter appearing first. At E. + N (upslope) edge Ward D, *B. gr.* starts about 60' from edge colony, *A. sm.* about 100' (from upslope edge). // Grasses from colony to outside at upslope edge, one site: Afe, Spa; Bgr, Asm; Age (+ Bout. curti., Carex) where slope about 10%. // Ward G, saw 10 (6 juvs.) at 11 a.m. On one old mound, tufts of *Andropogon scoparius* persisting. Grasses from center to upslope edge; Munroa sq., Aristida; then Carex, Bgr, Andropogon.

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July 26, 1955 Wind Cave N.P., S. Dak.

At another spot Schedonnardus; then Aristida; then Andropogon. Arist. fend. more or less surrounds Ward G in variable belt. Main forbs present: Dys. pap. (40% - more in E. 1/3); Euphorbia (geyeri?) (30% - more in W 1/3), Verb. bract. (est. 25%); also Sphaeralcea, Sol. trifl. locally common. One burrow near E. end Ward G (near pipe marker) recently dug out, apparently by badger. Much mint Marrubium (?) in a clump cut to 3" high (taller in June; now no cover for Sylvilagus). A. sm. starts about 30' short of E. edge. At E. edge ground drops in draw; Androp. scop. & Bout. curtip. dominate in draw, & no C. l. there. // E. side Ward D, colony to edge: cut A. fr.; then Buchloe (some A sm mixed); then (steeper, down) Carex, Koeleria, Andropogon (pines close downhill). // On bench 10' above level stream bed & between it & Ward D (E. of), some old burrows, many vigorous forbs on mounds, in area nearly pure A. sm. about 12" tall, seed stalks to 18". One badgered, apparently a few weeks ago. Apparently unfavorable there as no present occupants, but some 70 yds. S. on same bench (seen there in June too). An especially large mound on bench (18" deep, 8' diam.) made of gravel & coarse sand (1-2 mm. diam.); large because burrow caves in? To 10 yds. distant another burrow, about 1/3 of Stiff Goldenrod cut; about 1' tall, cuttings now dry. // In S. part Ward D, near bottom, near road, 3 holes badgered (last yr? in past) within distance 50 yds. radius. // In area farthest S., where small openings in tall Bja, I saw 1 juv. ~~[illegible]~~ Around some burrows Bja absent in area only about 6 yds. diam., & much A sm in (fairly sure A sm increases when Bja opened by C. l.). Some paths for 5 yds. thru Bja 8" tall, from opening to opening. // Ward A, I watched one stripping

Stakes in

N end 800' line trans. - edge Ward B - put 1" angle iron stake

N-S belt transect starts 35' SE of isolated 3-trunked pine; 0 pt. has 4" tall reinforcing iron stake. Each 100' a big spike driven, head 2" out of ground. Belt 400' long.

S end 800' line transect, 5' beyond spike, a 3' tall 1" diam. pipe with holes in it.

N end 160' transect, area X - 5' beyond rail - 1" pipe 3' tall with holes in it, & 1/2" angle iron stake 3' tall.

S end 160' transect - 1" pipe 2' tall, no holes in pipe.

at $\frac{A}{B}$ -/a, King grid. 1" iron pipe 2' tall, no holes,

at $\frac{A}{B}$ e/f 18" tall 1" pipe

$\frac{G}{H}$ f/g 3/4" pipe 6" tall

W. end of belt transect, 1/2" pipe 3' tall.

Intersection belt transects, 1/2" rod with T head, 1' tall.

Corner of King blind, 3/4" pipe with rocks around it.

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ripe Aristida fendler. seeds from stalks with teeth; this vigorous for 2 min. (until disturbed by me). Also it grasped green stalk Allionia albida & nibbled at it, & ate at plant of Chenopodium lepto., not cutting it down. // Saw 2 juvs. feed just inside SW part Ward A; apparently part of 5 juvs. adjacent. // I repeated belt transects of King on Ward A. These illustrate definite & substantial reduction of Bja at periphery! Soils & slopes too heterogeneous for diagrammatic zonation of vegetation to show up. Too bad vegetational work was not done on more uniform sites. // I set 15 snap traps, oat bait, along S. side Ward A (line g/h) to see if many small rodents present. Probably few; I saw no sign.

July 27, 1955. In 200'x200' area Ward A (SE quadrat counted was N f on King grid), counted 54 burrows. Probably increase not at all after a certain density achieved. Many of them not used now. Much lower density than Devil's Tower. // Ward C', down canyon from road about 100 yds., Asm 10-50% of veg. Bgr extends 30 yds. S. of road & starts 30 yds. from edge Bja at S. end colony. Thru C.l. area S. of road much Lapp. red., Sphaeralcea, but little Verb. br., Dyss. pap., Hed. hisp.. 30 yds S. road, 30' fr E. of ravine in bottom, Hed. hisp., Sphaer. coc., Bgr, Asm, Lap. red., Verb. br. mixture. // at one edge Bja (thick), Asm, Carex, Sphaeralcea mainly. at another site, Asm, Lap. red., Hed. hisp., Ambrosia (or Plant. pursh.). Diffs. because soil variable probably. Many Plantago purshii dry plants (any) lying on ground, roots missing; doubtless C.l. work. Lappula & Verbena bracteosa (green, some in flower) not cut. // at extreme S. end of C'; in center C.l. activity is Verb. br., Sph. coc., Asm, Ch.,
5% Asm (no other grasses, but Carex, stenophylla?) present +

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much cut when thick. 50' in from S. edge, Carex, Sphaeralcea, ~~much Euphorbia~~ Asm, (+ some Amsinckia ? (= Cryptantha?)), Hedeoma, Euphorbia. Then, toward periphery, 16" tall Asm & mustard, + Sphaeralcea (some Lappula, Cheno. lepto., Bgr, Solidago, Hedeoma). Succession at edge far from clear or diagrammatic. This last probably original condition before C. l. work; tall weeds 75% of vegetation. // Stacked 3 boulders at S. limit activity in fence. Nearest burrow not used now, 60' S. of this pile, 2' tall mustard, + Asm, Sphaeralcea, 1' Solidago, & thin mulch (80% unvegetated at base plants). Old burrow in this area had Sphaeralcea 12" tall; also Asm & Mustard on mound. // Shorttail soils & vegetation too complex for great usefulness in diagnosis effects C. l. on vegetation. 3 mi. N. Fairburn, Custer Co., S. Dak., at 1:30 p.m. I visited C. l. colony that I helped to poison with 1080 on afternoon of July 25. Found 4 dead on ground, saw one alive & lively, heard 2 more, but apparently kill good. No other dead animals found. Still many burrowing owls; 6 seen in distance of 100 yds. (Casts owls all insect, including grasshoppers, staphylinids. Barley cut to about 40' from burrows in the field. Apparently cut when green; some still partly green. 8" tall Kochia, amaranthus, & other weeds in barley field not seen to be cut, & judging by little eating of grain there & observations July 25, few dogs were in grain field now. At edge barley field every stalk cut at about 3" for hundreds of square feet. One area, all cut 20 yds. in + 50 yds. wide space. Burrows in unploughed Carex-Bgr. near edge field, but ~~some~~ many well-developed ~~was not into~~ mounds 50 yds. into field. Where most numerous, these spaced about as on unploughed ground & regular, about 20 yds. apart. One mound in field 1' thick, 6' diam. One burrow in field had cleared area 14 × 20 yds. around it. Near burrow on unploughed, Cheno. alb. 1/4" diam. stalk cut at 5" ht. One mds. +

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July 27, 1955 3 mi. N. Fairburn, Custer Co., S. Dak.

and bared earth around, principal forb Amar. retrofl.; also Dys. pap., Kochia, Sals., Sphaeralcea, Amar. blit. Several black widow spiders with egg sacs ~~seen~~ seen in mouths burrows. Apparently thick but short grass cover does not ~~inhibit~~ prevent digging of burrows; they are even in rounded bottoms draws (2" tall grass). Digging 4"-5" deep into soil around some burrows in grass. Dead C. l. had 100± dung beetles after caecum contents. Horned larks seen in poisoned area, meadow larks close by. No raptorial birds or mammals seen, or evidence of them found. Took several Ektachrome photos. // Examined two dead picked up. One ♀, (~~♀ 145~~)(♀145) 352 t. l. - 75 tail; 700 gms. Area nipples gray & thinly haired but nipples not protrude. Vulva black on protruded parts (& anal area). Ut. horn 55 long, 2 mm. wide, dark pink; no conspicuous scars. Much fat mesovarium, ~~little~~ none external thigh. Stomach wt. estim. 15 gms; caecum 30. Stom. contents 90% grass, including some (or most) Buchloe. Apparently little 1080 needed to kill. A molt line across shoulders; anterior new hair around ears, nape, muzzle back to eyes; basal inch tail new hair. Molt line across central abd., barer behind, paler anterior (to brisket). (Yearling? - teeth not examined). Other (♀143) a ♀ juv., 500 gms., measured 323-80. Vulvar area slightly pigmented; nipple areas not barish. Stom. est. 25, caecum 60 gms. Stom. contained 40% grass, some (oat?) hulls, parts of a beetle. Ut. horn 50 long x 1½ mm. wide, white, Modest mesovarium fat, no external (thigh). All back molted save crown. Belly uniform. Basal ½ tail new hair. Teeth show juv.

info on card

info on card ♀143

July 28, 1955 Badlands Nat'l Mon., nr Wall, S. Dakota

Talked with J. A. Rutter, Supt. since April 1953. He was interested in wildlife & knew much about it. Largest former town between Cedar Pass Lodge & Interior, both sides road. Most C. l. poisoned about 2 yrs. ago, & some illegally by ranchers. Rutter said he did not ~~publicize~~ publicize C. l. because someone might poison them "again." Cattle graze in monument &

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July 28, 1955 Badlands Nat'l Mon., S. Dak.

range not in good condition. Many C.l. now along Sage Creek, where difficult of access even by jeep. Attempt being made to restore native wildlife there (coyote & bobcat present now; may introduce kit fox; do not want bison). Rutter thought great increase in size C.l. towns from 1953 to '54 (expand in old town), but little this year (tho mild winter). Some badgers & eagles present, but not known to be at C.l. towns especially. Crotalus present, & dens reported years ago. // In general C.l. on uplands, best agricultural sites, this area. Rain ave. about 16"; most April-July. Last 2 years dry, this better. // I drove about 1 mile W. from Cedar Pass Lodge to look at old dog town (Rutter thought a few left). Slope est. 3-6%, S. Conspicuous plants are Bgr, Bda, Opuntia, Asm. Soil ~~[illegible]~~ pale grey clay-loam, easily dug with hand. Much bare ground between grass ~~tufts~~. On old mounds, plants noted: Euph. marg., Asm, Salsola, Sol. trifl., Sphaeralcea, Poly. avic., Schedonnardus, Bja, Verb. bract., Amar. bl., Dyss. papp., Chen. lepts., Hordeum, ~~Arx~~ Munroa sq., Opuntia, Aristida (fendler.?), (Isauna Rocc.?). At edges mds. Bgr, Hordeum, Opuntia, others. (Ant cleared (6' diam.) areas favor Aristida & Munroa sq. edges). Grass generally 3". In Opuntia clumps 16" tall Aristida, & ungrazed Bda, Bgr. In pasture, away from mds., Hedeoma hisp., bush Eriogonum, Poa (secunda?), Gutierrezia (in flower), Psoralea ten., Festuca octof., Ratibida, Rosa. About 1% mid grasses. Bda thick & solid in some dips (little opuntia there). On damper swales ~~also~~ few burrows; Andropogon & Bout. curtip. (green, thicker, taller) present; // Mds. 95% bare, water washed. Many burrows still open (black widow & other spiders), some caved in (1' diam. hole; dangerous to stock?). These areas adjacent to eroded bluffs (Took ~~st~~ sketchmap photos). // Philip, S. Dakota

Talked with Mr. Zimmerman, SCS here. He 12 yrs. Haakon Co., all

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July 28, 1955 Philip, S. Dak.

life on plains (Nebraska earlier); an oldtimer much in field. He believed he had seen much destruction vegetation thru overutilization by stock. (In sandhills, once big bluestem bottoms, little bluestem slopes; now gone. Streamside shrubbery gone.). He believed much of cause was that stock could be moved out & in easily, so overuse during & after drought, while in early days drought caused long reduction in herds. (His parents homesteaded where they had to haul water 18 miles). Zimmerman regretted poisoning of coyote, ~~prai~~ prairie dog. He knew of no *C. l.* in Haakon County. Formerly abundant; one town extended several miles. Big reduction campaign about 2 years ago. // I talked with Don Thompson (captured ferret 1953), enthusiastic prairie dog shooter. He would rather shoot *C. l.* than antelope. Sometimes shot close to 100 in day for sport. He & others knew of towns (such as one near Cottonwood) not far distant, & they would shoot there occasionally, keeping population down but leaving sufficient for reproduction. Don asked about trapping *C. l.*, as he wanted to establish colony close to Philip, for shooting. He very wary about divulging locations towns for fear someone would poison them. Strong for prairie-dog conservation. He thought reproduction excellent one site this year; 6 to 8 on a mound. In one pasture where mostly short-grass but little grazing, he thought *C. l.* especially fat now.

Wind Cave Nat'l Park, S. Dak.

July 29, 1955 Norbeck Dam colony. No *C. l.* about 80 yds. radius to W. of display sign, & about 80% of veg. there A sm. apparently ground too wet at critical time yr. (or snow stayed), this being ~~flattest~~ part colony. 100 yds. E. of highway (85A) on this town, sev'l new burrows on slope where veg. is short but continuous Bgr-Bda. To W. of sign, much A sm for about 150 yds., then slope steepens & Bda starts (also Bgr). Buffalo wallows - some have a *C. l.* burrow at edge /. Wallows ~~open~~ open ~~vegetatation~~ vegetation & allow invasion

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July 29, 1955 Wind Cave Nat'l Park, S. Dak.

forbs; these conditions favor C. l. In head of draw 300 yds. w. of display sign, perhaps 15 C. l. one acre, including juvs., on 10% slope. At edges the colony ascends 15% gradual slope & continues at higher level, 4± % slope ±. // I saw a coyote in Bja just W. of Norbeck Dam town at 8:30. Bja gives cover for hunting? // Town extends W. 50 yds. beyond electric line. Possibly little or no larger than in 1951. Where Asm about 5% of veg. in area Bgr, much of it cut at base & lying, dry, on ground. // I put stone markers around a square, 400' on side, in well populated part of Norbeck Dam town (SE corner at Cole pipe stake; oriented N-S). At about 10 a.m. I counted 20 C. l. in this area (near 4A). // At top of slope to W. of sign in Norbeck Town (300 yds. W.), Lapp. redowski 40% of veg. & to 1' tall (not cut) at some sites. // Amaranthus graecizans now mostly dead & without foliage; its brown aspect of 2 weeks ago gone. A wet buffalo wallow in Asm. area is now covered with Polygonum aviculare. // Sept. 1938 air photo Norbeck town shows area behind sign (W. of) with rectangular marks (of old corrals?). // Visited town #3, which had grown much 1947 to 1951. Now seemed about same area as in 1951 (occupied) except no C. l. seen in NW extension (poisoned once?). Many juvs. it seemed, 3 or 4 at several burrows. This area a shallow basin of gentle slopes, mostly < 5% slope. Main veg. is Bgr with patches Bda, about 2" tall, with about 5% forbs (Sphaer. coc., Plant. ~~hisp.~~ spin., Hed. hisp. Some mounds large & low; Bgr & Bda growing well on peripheral third of md. Saw one Citellus 13-lineatus (sure) go in C. l. burrow. Several bison wallows here, & bison trails. // On mds., Sphaeralcea, Asm, Sol. trifl.; much sparser veg. on mds. than in Shorttail. Principal weed patch about 50 yds. SE of Cole stake #1 (in 1947 colony); about 60% short grass, but rest Sphaeral., Hed. hisp., Plant. spin., Asclep. pum., Erysimum, Potentilla, Psoralea tenuiflora. Dog area ends at about 15% slope all around, where veg.

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July ~~28~~ 29, 1955 Wind Cave Nat'l Park, S. Dakota

changes to Androp. scop. dominance & ground steeper & with more large rocks. (Asc starts 15-25% slope). No Asm at #1 stake, then (to N) (upslope) Asm comes in, & increases to about 5% (15% slope), Bgr - Bda still present, some Aristida, also more bare ground. Then Carex, Asc. Burrows (old) high on slope not now occupied. Many burrows throughout colony not used. No apparent increase in no. burrows in 1947 area since 1951 (some new holes). Some mds. ~~large~~; 20'x1½'. Soil silt loam (judged). Patches of Bja near colony but irregular, & generally not near C.l. burrows. (Distrib. Bja irregular all slopes & in ph.) // W. end Norbeck Dam town where new holes, 40% Bgr - Bda. Many seedstalks Asm cut; also stalks Afe, Poa, Bgr. // Idea: effect C.l. on veg. deps largely on condition at x invasion. Bja - Asm mixture → Asm → weeds, Bgr-Bda - Asm mixture → thin Asm (spots Bda) → weeds. // Lower Sanctuary-town. On W. slope, 10%, many mds. (10 aver. 6 yds. apart); most veg. bright green Dys. pap. 4-5" tall, some Vbr. These weeds abut thick Arist. fendl. at upslope edge. At S end this colony main veg. is ~~Asc~~ artem. frig. on E. slope (10%), with dry sticky Lapp. redow. mixed; & some Asm, Aristida. at upslope edge, Asm increases as Art. frig. taller; then some Bja, Carex mixed. Then tall thick Bja with Asm (uphill side colony). // At Upper Sanct. town, 11 in 2 A plot (no seen juvs!), but 13 in N. acre of area (edge). Within area concentration, no obvious vegetation diff. from where few dogs; little Asm (5%), no Bgr. Androp. scop. - not in even on 5% slope, where 10"+ tall (but bordering this an area where Asc grazed to 3", ~~& prob.~~ & some C.l. activity there. In another part this colony (E slope), much Asc grazed short & some burrows in it. One site, tough bases Asc left as island where C.l. scratch around burrow. In gen'l, it appeared few burrows in Asc even tho short (few food forbs?). There were also a few burrows in area where Carex (sten. or penn.) made up half vegetation (50% bare),

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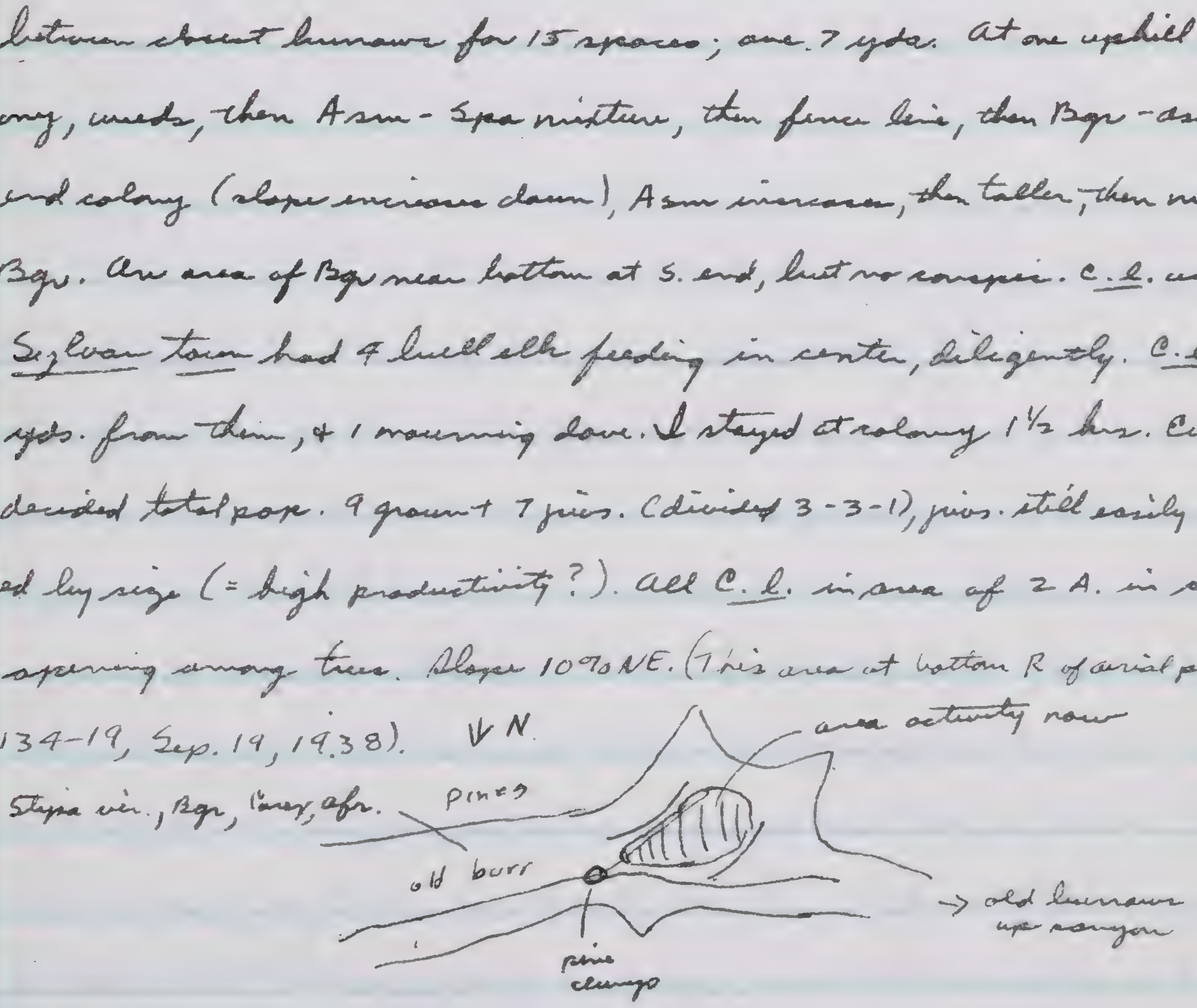
but none where Carex thicker. (Step loop 1" - 50 loops in 60 x 60' area around farthest burrow: Bare 52%, Bgr 26%, Carex 20%, forbs 2%). Probably few C. l. where much carex in this area. // At E. side Upper Sunset town, fence posts without wire. To E., more A sm, & some burrows but not currently used. Asm goes to about 25 yds W. of fence, thinning, then forbs only. Slope of colony here about 6%, W aspect. No Bgr. in census plot or in most of colony. Where burrows E. of fence, much A sm (10% of veg.) cut & dry (used before forbs came in?). Where burrows stop, Carex & Asc increase, slope steepens, rocks protrude, pines grow. In census plot I paced distances between closest burrows for 15 spaces; ave. 7 yds. At one uphill edge colony, weeds, then A sm - Spa mixture, then fence line, then Bgr - Asm. At S. end colony (slope increases down), A sm increases, then taller, then mixt with Bgr. An area of Bgr near bottom at S. end, but no conspic. C. l. use here. // Sylvan town had 4 bull elk feeding in center, diligently. C. l. out 20 yds. from them, & 1 mourning dove. I stayed at colony 1½ hrs. Eventually decided total pop. 9 grown + 7 juvs. (divided 3-3-1), juvs. still easily distinguished by size (= high productivity?). All C. l. in area of 2 A. in center of opening among trees. Slope 10% NE. (This area at bottom R of aerial photo BNW 134-19, Sep. 19, 1938). ↓N.



Dogs tame; one allowed approach to 10 yds.; juvs. to 20. (Virginiana feed late in day probably, in spite of King's statements). Two juvs at several pieces of Dys. papp., cutting off part or all plant low down, holding & eating stalk & leaves from base up. One ate many tips of low Amar. blit., just holding plant + nibbling tips, not cutting off (this kind feed makes plants

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stunted & spreading?). Verb. bract. present but apparently not eaten. Food is apparently found with nose, pushing it along, find food, eat, until steps then feed again. Move often during feed so effects spread rather than local. In ½ the occupied area, Lappula redowskii (dry now) 80% of veg., in other half Vbr. 90% There perhaps not eaten (but Lower Sanctuary, Dpa principal plant where many burrows & dogs!). Dpa cut many sites, top left on ground. Plants on occ. area now: Lre, Am. retro., Asm, Poly. av., Vbr, Dpa, Art. fr. (cut), Am. blat., Sal. trif., Hed. hisp., Psor. ten., unknown amar., ~~asm~~ Rosa, Euphorb., Ratibida, Carex (not filif.), [illegible] Panicum (not in order importance). Schedonnardus thick in bordering areas, present in feed area. One seemed to strip tops seedstalks of Spa & eat (where Asm plentiful). No apparent tendency to visit grassy areas. Many grasshoppers now (& elsewhere park). Down canyon from activity are old burrows to at least 100 yds. distance. Close grazed Androp. ger. there (by elk?). Area N of streambed, where cuttings June, not used now. // In Upper Sanct. town two seen out 7:10 p.m. (clear, calm). One ~~fam~~ group 6 juvs. at 1 burrow near edge colony where much Bgr, & Asc near. // Antelope on Lower Sanct. town midday. Nearly every morning on Ward D. Shirttail. Not improbably C. l. favor antelope, elk, doves, at some seasons (crows, magpies too?).

July 30, 1955 In general, where now much Bja on slopes less than 15%, & not so flat or low as to have high water table, seems to be excellent terrain for C. l. (proper soil texture, climate). These areas stand out clearly (brown) at this season. // Bison Flats colony examined. 100 yds. E. road, ~~mainly~~ mainly Bgr, but some Bja, Asm, Sphaeralcea (few weeds). Ave. min. spacing 10 burrows 14 yds. At S. side colony, upslope from old dam, as many as 10 dogs/A. in one area, 5/A in most (high at 200 yds. SW dam on NE slope). Upper

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limit here where carex abundance stops & Androp. scop. takes over dominance (clear line). // In old part town W. of dam, 5% slope, mds. large & gently sloping (as if old), up to 5 dogs/A. This area lower, flatter, greener than higher slope where more density. In this old pt., ave. min. spacing burrows (10) 11½ yds. Bgr & Asm about equal, 50% ground bare (paced step loop analysis). // In area up slope where many dogs, Carex filif., Bgr, Bda principally; about 5% forbs (Sphaeralcea, Art. frig., Solidago, Eriogonum, Psor. ten.); 50% bare. Carex & Bgr about = & dominant; former gives yellowish cast to whole. // 10 meadow larks on ground in area 2 A, as if feeding. // Old pt. town E. of dam (1947, Cole map) on 5% slope. Mds. very wide. Some juvs. present. 1/5 Part area now in thick Bja (3% slope); mostly (Bgr?) Bja, Asm, (=Bda?) Bja. In part of area much Lappula (only where many C.l.?), (=Cryptantha?) Amsinckia (?), Art. gnaph., Art. frig. Some mds 30' across, peripheral 1/3 of slope in Bda-Bgr, & md. 1½' thick center (silty loam; mod. gravel; cows in ?). Sphaeralcea coccin. forb on mds. Some ~~Art~~ Arist. fend. on lge. mds. Afr. & Art. gnap. (short) surrounds one md. starting 5 yds. from center. Area 50% ~~B~~ cover, mostly Bgr., but Asm more abundant ~~in~~ at some sites (lower). Lge. mds. surrounded Bgr - Bda; surrounding (5 yds. out), Asm more dense, & much of it cut. (C.l. reduce Asm, favor Bgr - Bda). Asm color predominates in bottoms & foot slopes. Ave. min. spac. burrows 13½ yds. on 5% SW slope here. Bgr-Bda about 85% of veg.; Asm 10%; weeds 5%; bare 45%. ~~Some~~ Some Arist. fend. // A rocky hillock of 5% slope had much Andro. scop., Art. frig., & Car. filif. prominent. // Next little valley to N. of old colony, ± 100 yds. E. road, 3 or + dogs/A. This has

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July 30, 1955 Wind Cave Nat'l Pk., S. Dak.

extended to N. since 1951 (see Cole maps). // W. of road in Bison Flats colony, dogs present 1951. Slope of most bottom about 2%, gen'l slope direction like main part Norbeck Dam town. Dogs mainly at S. side of bottom & up slope this side, to 250 yds. W. of road. Much Bja this general area where slope steepens. About 50% gnd. bare where C.l. Bgr. dominates. Beyond area dogs, Asm about 2' tall (seed stalks) but not thick. In area occasional patches of Bgr-Bda, & these often the ~~area~~ area with C.l. burrows (favored first? or made by C.l.?). Some bison dusting wallows make other openings veg., but no C.l. burrows in these. Low population dogs this area – about 1/A near ft. slope where most; some up to 15% slope (S. side valley). Much Asm cut near used burrows. Some Penn sedge torn up, & some cut at base near burrow (eat basal swelling?). Sedge indicate wet spots here? Many mds. centered in area Bgr-Bda dominance – 10 yds. diam. often, more Arist. fend.; Asm around. Took some photos this. A burrow 200 yds. W. of road freshly badgered (caecum, dry, present). Lgst. no. burrows within 100 yds. highway (S. side valley) where slightly higher ground, Asm < 10%, mostly Bgr-Bda. Out on flatter ground, some low mounds 30' across, 2-3-4' high, mostly with Bgr-Bda cover ~~in area~~ surrounded by tall Asm. Many of these lge. mds. with C.l. md. on top. Perhaps large mds. old C.l. mds. former yrs. Definitely C.l. on areas short rather than mid-grass dominance here. Flatter ground may sometimes be too wet for C.l. Last evening I saw herd Buffalo here. ~~At~~ 3 mi. S. of Mule Creek Jct., E. central Wyo. Revisited poisoned town here. Kill evidently poor; at least 15 dogs seen in area about 5A on slope. None seen in bottom

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July 30, 1955 E. Wyoming

of draw (poison more effective there?). On 20% slope at side of bottom, among hedged Artemisia tridentata bushes, many diggings to 10" deep in fine sandy loam (fox?). Carex, Aristida, Stipa present, but 80-90% bare. Some mds on upper gentle slope surrounded by a ring of ~~thick~~ Amsinckia (=Cryptantha?). Much Pl. spin. in area below where much Carex filif. (steeper). In gen'l, 40% cover estimated. On upper slope Art. trident. hedged to 6" height (by sheep?). Ave. min. spacing burrows halfway upslope = 13 yds. (10 spaces). Same 18" thick, 6' diam. Took color photos area. Larimer Co., Colo

August 3, 1955 with Harold Swope (Game & Fish, Ft. Collins) and Kenny Milyard, pilot, flew low over plains of NE Larimer Co., Colo., to (count antelope and) photograph C. l. towns. Because little grass, burrows not conspicuous, but holes could be seen easily from 200 ft. altitude. Beside the Sec. 10 town, photoed town in Sec. 23, & another apparently in Sec. 3 (T 11 N, R. 69 W), & other near Tony Roman's (S. 16, T 11 N, R 68 W). We covered most of ground in about 3 townships (and saw 100± antelope in all) but found no other C. l. towns. Many ~~Pogono~~ ant mounds & clearings, however, these often conspicuous in green grass, + in formerly ploughed fields; also conspicuous because of different vegetation around ant clearing. Land surface in general not uniform, but small diffs. in vegetation mottled over nearly flat surfaces. Many low "pimple" mounds in this region.

August 4, 1955 Nr. Wellington, Larimer Co.

Brief visit to Wellington colony. No extension at all to N, where farthest burrows marked last spring. This area thick Kochia & Atriplex bushes (would main part colony be same with-

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August 4, 1955 Nr. Wellington, Colo.

out C. l.?). On main part colony, some areas dead Bda (killed by C. l. eating in winter?), only stubs of stolons left. Atriplex shoots cut & many stems of Kochia, but plenty K. left (99% of veg. in W. 1/4 colony), 3"-6" tall, covering ground. Old barley field at N. S. side horse pasture now ploughed up. Much Salsola, Kochia, in horse pasture. C. l. somewhat ~~hard~~ hard to see because of weeds. //

CPER, Weld Co., Colo.

arrived 9:45 a.m.; 8/10 cumulus; not hot. Inspected area E. of E. ~~fence~~ fence line. Farthest S. burrow July 21 showed no current use; no more dug that ~~area site~~ vicinity, farthest S. used being 40 yds. farther N. (2 more used 30 yds. N. of that). Mapped burrows E. of fence. Several new shallow diggings in quadrat A'0. One 4" deep at base Opuntia; another at base dead Chrysothamnus bush. Soil loose & silty; another, 6" deep, between tufts Bg. & Muhl. torr. 50+% bare ground this area^{5}. Shallow burrows (for food?) about 10' apart. No current activity SE of angle iron stake no. 36 (see map), but burrow 80 yds. WNW this stake apparently used. Near 2 2S, 0 W, found fresh intestine & caecum of C. l., excrement of large bird, & a few hawk feathers. 30' distant was skin, head, & half meat of fresh C. l. ♀137 (today's kill probably). Later I saw a Falco mexicanus low near the site & a Buteo 1/4 mile distant. C. l. body of a grown ♀. // Chrysothamnus bush 10" tall 3' from C. l. burrow had 15% shoots cut off & left (in genl, Chrys. seems little cut). Much Salsola & seedstalks Bg. cut thruout colony. // I shot ♀136 at C2 in MB' (see map) at 12:30 p.m. This crater large, used early this year. No recent cuttings found more than about 10 yds. E. of that crater. Apparently Cleome not cut (bad smell, taste?) tho isolated plants 2' tall present. Prickly Cirsium & Argemone also not cut, Verbena bracteata rarely. On central flat where thick

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August 4, 1955 CPER, Weld Co., Colo.

stand of Bgr; thousands Bgr seed stalks cut, about 6/sq. ft. commonly. Cheno. lepto. also cut, & occasional prickly Solanum. // Saw 2 or 3 Speotyto on colony, & a Crotalus lay in burrow in CI. Open water in ditches in bottom still. Many burrows in flat bottom used, tho mounds small or absent, tho earlier these were flooded. Some new burrows in ~~SE~~ NE corner colony, 1 atop slope in BB is farthest NE. In area 14-22 W, 6-10 S, many (20±) C. l. seen to run from Bgr flat southeast to burrows on slopes. On these lower slopes, many short new burrows sev'l inches deep. // Expansion to S. in area 20 W, 10 S. has increased slightly since July 21, peripheral burrows showing use. (not in E or SE parts colony however). Some burrows made last 3 months have fairly large mds. (to 6' wide, 8" thick). A crater at W. side of the exclosure plot 2' diam. & 8" high. // In exclosure, tall Salsola in C. l. excl. stands out conspicuously, to 23" tall (in cattle exclosure 90% cut to 8" or less). Bgr seed stalks to 11" in C. l. exclosure, rarely that tall in cattle excl. & 10% seedstalks cut there. // ♀137, hawk kill, full adult ♀.

August 5, 1955 Much rain last night, & overcast today; most mounds packed by rain so hard to judge use. Depressed burrows on flat in Bgr area full of water. At least 3 C. l. east of E. fence (trapped one late p.m. in A'P). Saw a Buteo regalis near colony. Family of 4 or 5 juv. Speotyto at burrow in ED. At least 9 C. l. seen N. of bottom from 0 to 4 W.; & 10 from 4 W. to 10 W. (5 or + juvs.). // Burrow in PC' that was 10" deep June 26 is now deep & apparently in use. 3 new well developed craters to N. of fence at W. end colony; all have appeared since July 21, apparently. Northernmost burrow this area now partly filled ~~apparently~~, not used. r2 in PC' is furthest NW showing use. // Trapped ♂ 138 in NE part of A'~~44~~P; prob. got in 5:30 p.m. // Put

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in 50' of line transect in invaded NW area, starting about 40' W. of stake at 30W 2N.

August 8, 1955 at SE end colony; *no activity* where ♂138 ~~shot~~ trapped Aug. 5, but new repair (today) to E. of 0W, 28S. mark (set 2 steel traps there). Bottom soaking wet, 1" water standing, burrows there flooded (rain last night & prev. 2 days). In burrow where *Crotalus* seen a few days ago, mound repaired today. Looked in 30± burrows; no snakes seen. Two juv. *Speotyto* same burrow as last visit. At NW end colony, digging at burrow r 2 in PC; & especially craters between there & E-W fence. Completed 100' transect starting 40' W. of 30W 2N; ending brg. 240° 81' from 30W 4N. Marked with spikes at 0, 50, 100'. This in area invaded May - June & still occupied. S. end transect brg. 346°; 41 yds. from fencepost with (25) tack on top; 1" pipe 1' tall at S. end lines (2' S. of start).

August 9, 1955 Made overlay maps showing new & old burrows, sites of dogs seen. In area of S. invasion near center, burrows used to peripheral ones, & more made since last mapping there. This invasion reaches to edge of a flat area where *Salsola* abundant & tall (1½'). Perhaps tall weeds prevent invasion; they are near tallest soon after time of yr. when expansion occurs (June). *Salsola* may also have caused withdrawal of dogs from area N. of 18W to 26W. // Several skulls & parts picked up near or on mounds. These apparently thrown out when burrows opened up (some *Sylvilagus* bones too). No eagle casts atop hill to N. colony, nor any eagles seen there since winter. One marsh hawk seen over colony today. Divided area into 10 census & ecol.-areas on map. Highest concentrations in zone VI & I. These are

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slopes with swales, but VI apparently old part colony & has more weeds (*Cryptantha* prominent, but also N. of fence where no C. l.). Photoed 100' transect area. Nr. Wellington, Larimer Co., Colo.

August 11, 1955. At Wellington horse pasture colony (now no horses) weeds, especially *Kochia scoparia* & *Salsola kali-t.* have increased in abundance & height during summer. The north central third of area has weeds (Ska mainly) widespread, with many bare ground spaces a few feet across, & most C. l. now in this area. In most of the other sites where burrows, weeds relatively low & sparse. It may be that burrows made here because of sparsity weeds at season of spread of dogs, not because of effect dogs. Dogs mostly on higher drier ground. Made overlay map of general vegetation. Practically no grass (less than 1% Bda; much more dead Bda) except *Distichlis stricta* & *Sitanion hystrix*. ~~Littl~~ No sign activity in most areas dense *Kochia* where many new plants, but much cutting at bordering area & isolated weeds. About 19 C. l. seen, all but 5 being in N-central third colony. No expansion in area of colony over earlier this year, but some new burrows within occupied area. Burrows used to near extremes of former use (apparently not the SW-most one ~~and~~ or NE-most one. Field to S. of colony ploughed a few weeks ago; no new greenery there yet. Old burrows reopened to 15 yds into ploughed ground. No reopened burrows ~~S. of~~ in ploughed ground S. of area E of 00 pt. at fence. Some *Speotyto* seen (no juvs.), but perhaps 2 only. In area of Ksc, some diggings to 3" deep (for ?insects?). Some new burrows in areas where Ksc 12-18" tall but with spaces bare ground 2-3' diam.; much cut Ksc around these in irregular manner, to distance 5

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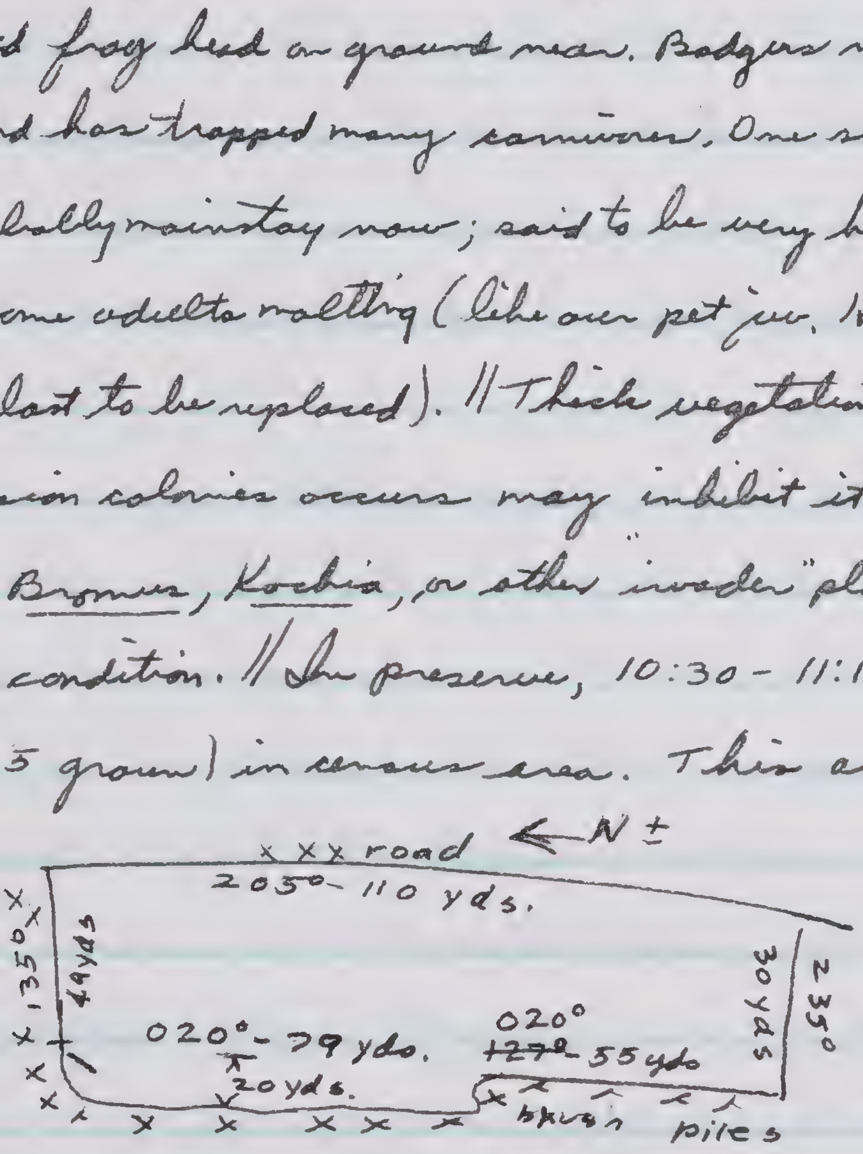
yds. some directions; only ½ of stalks cut, ~~not all, if some~~ many tall standing, scattered. Distichlis str. bright green, 6" tall; apparently no fresh cuttings (but old, dry). (One burrow dug out to 10" diam. to 2' depth, & part of dried frog head on ground near. Badgers not known here tho Gurney Crawford has trapped many carnivores. One seen eating Kochia leaves. This is probably mainstay now; said to be very high in protein. // Noted tips tails some adults molting (like our pet juv. Herman; black tip apparently last to be replaced). // Thick vegetation existing at time when areal expansion colonies occurs may inhibit it - this vegetation may be thick Bromus, Kochia, or other "invader" plants that indicate poor range condition. // In preserve, 10:30 - 11:15 a.m., counted 24 (of which 5 grown) in census area. This area measured as follows:



The W. (downslope, 5%) half census area had much new Ksc, 6"-12" high; relatively few dogs in it. Most on upper part slope where more bare ground, more Atriplex & Chrysothamnus shrubs. Saw some eat Kochia. Grasp stem & eat leaves, especially tips; or cut at base, hold in paws, eat from at cut base. One stood, ate at 12" tall Ksc without cutting stem. I also saw one Citellus 13-lineatus on census area, eating Kochia. No burrowing owls here now on census area. Saw 6 juvs. on one mound. No dogs seen NW corner census area (Kochia thick). A few new shallow burrows under edge of Atriplex bushes. These shrubs stunted to 6" height & spreading, & digging around edge forms a short (3-4") pedestal of earth.

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August 11, 1955 Nr. Wellington, Colorado.

Digging of burrows in side of pedestal. Same with Chrysothamnus. These shrubs constantly clipped; Eurotia lanata clipped only where C. l. thick, at this season. // To N. of census area (opposite side of line of brush piles), few dogs, & no extension colony ~~into~~ farther along similar slope into Kochia & large Atriplex & Chrysothamnus brush area (winter food not put here but in census area & to S). So no evident expansion of this colony this year. Predation not evident (constant skunk & cat trapping; no carnivore scats found; no remains found tho Crawford visits constantly). // Using step-loop method with 1" loop, I ran 3 lines N+S across census area. For 200 points, result was: Bare 119, Ksc 59, dead Bda 17, live Bda 3, Shrubs 1, Amaranthus 1. ~~Et~~ About 1/3 of line in W. half where Kochia sometimes 8-9 out of /10 hits, while bare ground similar in upslope half colony. Also in area was dead Muhlenbergia torreyi, Chrysothamnus, Atriplex. Dead Bda was stubs only, some stolons. Past dryness probably contributed to its dying, not just C. l. // Exclosure now shows much taller vegetation than outside it. Outside much Ksc & Chrysoth. cut. Plants in exclosure (photoed): ~~Ko~~ Ska & Ksc & buck Eriogonum about equal + most prominent; Muhl. torr. present, green, with 6" seed stalks; about = amt Cryptantha in seed. One plant Cheno. lepto. + Chrysopsis (?). In area near exclosure, these plants + Amaranthus retroflexus, Euphorbia (geyeri?), Eurotia, Solanum triflorum, Astragalus. // Near mounds some Chrysoth. so cut + undermined as to be dead, appar. killed by C. l.

August 12, 1955 Nr. Ft. Collins, Colo.

Spent afternoon at Spring Canyon Dam colony. Counted up to

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17 dogs from N. end. These in 1's + 2's, well scattered, most being near edges swales. Occupied area extends S. over low crest + about 200 yds. beyond, tho recent activity only 150 yds., + thence 100 yds. to W. Invaded area part of old colony, where principal cover Bda. Some new burrows; many old reopened. Slopes 5-10%. W-facing slope to S. of crest has more bare ground, Aristida, + Asm, than invaded opposite slope, but old mounds there. // Euphorb. margin. present some sites + mounds. A single plant 1' tall on used mound, but *not cut*. Much in swales to N of E-W fence, but not cut there, tho adjacent green Ska (*Salsola*) cut. A single *Cleome* 4' tall also uncut. Near one burrow, recent construction mound has torn up 6'X3' area of Bda, grass being tossed on mound. Around one burrow, a low dug out area accumulated water, apparently; Asm much increased where Bda absent here. // By step-loop method I paced area between burrows around swale # S of E-W fence, in area of most burrows. Results, for 200 vegetation hits: Bda 166, Bgr 21, Ska 5, Asm 2, Sco 2, Others 4; bare 79 (=28%). E. slope higher grass density than W. slope. Bgr more on steeper parts, Bda more on bottom swale. Asm dry now. Others present: Opuntia, Psoralea ten., Sphaeralcea, Euph. marg., Applop., Bromus, Bahia, Gutierrezia. Overlay maps made showing location dogs + limits sign. Most Bgr seed stalk cuttings now dry. Fresh *Salsola* cut however. Nearly whole original area in use + extension to S. (what age class there?). This extension probably took place in June or July. No sign of carnivores, but 1 *Buteo* seen over colony. 10 mi. N. Waverly Larimer Co.)

Arrived Sec. 23 (Rudy Ackerman's) 9 a.m. Clear, calm, warm. Saw

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August 15, 1955 NE Larimer Co., Colo.

no dogs E. of wash, but fresh digging there; these old burrows, reopened, not new. Farthest E. burrows on flattish sometimes wet area with Bgr, asm, Dys. pap. cover, about 50% (step-loops). Mostly on & bordering grassy flat area (grass 1-2"; asm 6-8"). // At E. central part colony, W. of wash, about 3 A triangle of 5-10% slope betw. two swales. Easy to count dogs here; 5 seen. // In general, 1-3 dogs per acre in diff. parts colony. At E-central side, many shallow diggings among open *Salsola*, *Eurotia* stand in loose soil. 4-7 holes / sq. yd., to 4" deep, for 50 yds. fairly continuously, & at other spots. Many fresh. Many with stub of large starchy root 3/8" diam. at bottom (collected; same as spring). Could not find plant having similar root. Possibly ~~same~~ some dig for insect larvae. Much dig for *Allium* at S central part colony, where concentration greatest - fairly flat, green swale with Salsola, asm, & Atriplex, Dys. pap., Salvia, Solanum (purple). At both areas many asm leaves uncut (tho many old culms dry on ground, cut earlier). // Where *Atriplex*, shoots 12" long cut, long ago & currently. Few shoots left; hedged bushes about 10" tall. *Salsola* (*Ska*) cut much less in same areas, & *Eurotia* cut practically not at all (8"; but cut in Sec. 10 in areas where *Atriplex* scarce). // In E. part colony on slopes, away from swales, only 4 hits per 100 loops (asm, Ska, Atriplex, Bahia), but *C. l.* fresh mound workings. *Ska* cut in swales where tall (1½') & thick. // Probably this swale veg. sustains *C. l.* much when area of burrow is denuded. Swales every 100± yds. in this colony. // *Buteo* *regalis* flying over colony 10:15 a.m. // On E. slopes where *Eurotia* dominant, few *C. l.* Clay loam soil; erosion pavement. *Eur.* *lan.* 8" tall. Some *Opuntia* & scattered single *asm*. *Eur.* *lan.* 1'

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to 6' apart. Otherwise, estimated about 4/100 veg. hits. A few old *Bgr* clumps, barely alive (due *C. l.* or stock?), leaves ½" long. *Asm* has no seed stalks (due *C. l*?). *Bgr* to 5%, same sites; more in small swales, & some *Bda*. *Opuntia* dead in *Eurotia* area. // It is evident that mounds tend to be on higher ground bordering the swales. Sometimes 5 mds. in nearly a row, 20± yds. apart. // Where *Ska* thick in draw but not close to burrows, little cut. // Only one carnivore dropping found (saved; has probable *C. l.* hair). Skulls of 3 long dead found on one mound. One dead *Lepus* found. Apparently badger dug hole had ~~A~~ rabbit (*Sylvil.*?) hair at entrance. But [illegible] very little sign recent predation. // Do predators have more important influence when population is low? If badger takes equal no. dogs/yr., yes, but probably success of carnivore deps. on density. // In *Eurotia* area, E slope 5-10%, took step loop density. For 100: dead Bgr 3, Asm 3, Eurotia 1; for another 100, dead Bgr 1, Asm 4, Eurotia 5 (arbitrary counted hits), peren. forb 1. Total hits 9/100 (for 200 loops). // On SE slope, 5-10%, omitting swales:

	100	100	100	
Eurot.	2		5	
Opunt.	1			
Atrip.		3	1	
Chrysoth.		1	1	
Asm	1	1	1	
Vetch			1	
Euphorbia			1	
	4	5	10	= 19 (6⅓/100).

Several new burrows, shallow, at bases pedestaled *Atriplex* shrubs. Much more digging than early this summer, it seems to me.

Near E-W fence in S. central part colony, where greenest, flatest, between 2 swales, saw 14 in 1 acre (5 on one mound). Upslope in colony,

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6 in one acre max. (+ 3 at 1 ~~b~~ mound). In area there of greatest burrow concentration, min. spacing between 10 consecutive was 6 to 22 yds. (ave. 12.6 yds.). In gen'l, impossible to find more than 4 or 5 burrows consecutively less than 20 yds apart. In gen'l, spacing ave. about 30 yds. where fairly many burrows (~~poor~~ scarce food, wide space?). // What happens to coterie territories when burrows wide spaced, population low? Are most coteries in areas between swales, not crossing them? // In flower; a blue flowered *Salvia*, purple *Solanum*, *Gutierrezia*, *Verbena bracteosa*. // Difficult to correlate range condit. & population here because area of range to sample unknown; dogs in large area may depend on swale veg. in small area. // Visited Sec. ~~2~~10 colony 12:30 p.m. to 2:30 p.m. Saw 1 *Aquila* in air, 1 on ground at edge colony (hilltop), & 2 Buteos (*regalis*? ~~*swainsoni*~~?) in air over colony. No carnivore scats or sure fresh badger digging. Much 10" *Eurotia* cut here (why not in Sec. 23?). Soil less clay than Sec. 23 (silt loam S.10) & pale tan in color. Many *Pogonomyrmex* mds. on slopes. *Salsola* is main plant on mounds; some *Chenop.* (*lepto.* or *alb.*?). Live Opuntia present, ~~not at~~ not abundant. *Atriplex* cut much where occurs. *No digging* for roots noted. Much more grass than sec. 23. // At NW part colony took 100 step-loops where many mounds on 5-10% SE slope. Results: 54 hits on live veg. (Mto 23, Bgr 17, Aristida 5, Chenop. 2, Eurot. 2, Ska 4, Schedonn. 1). In gen'l, then, cover about 50%, mainly *Bgr* & *Muhly* 1-2" tall. // In S. central part on slope where concentration burrows, 100 loops gave 47 hits (Bgr 18, Mto 14, Ela. 3, Ska 1, Aristida 1). Adjacent was more *Bgr* in bottom shallow swale. ~~Air In~~ nearby area, N slope bordering flat where 85% cover, 90% being *Bda* (some *Spa*, Eurotia), 100 loops gave 55 hits (Bgr 31,

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August 15, 1955 NE Larimer Co., Colo.

Ska 3, Mtb 10, Sporobolus (?) 2, Eurotia 1, Aristida 4, Chenop. 1, Bda 1). This may be oldest part colony. Noise of trucks prevented counts. Hilltops where no C. l. burrows about 50% cover, 95% Bgr.

August 16, 1955 CPER, Weld Co., Colo.

Made overlay map of Sec. 22 colony showing locations of at least 54 Cyn. lud., 6 Speotyto, 2 Sylvilagus seen. Green, wet in bottoms. Set 5 steel traps 9 a.m.; no catch by 3:30 p.m.

August 17, 1955 In traps set at mouths 5 C. l. burrows, took 2 Sylvilagus & one Speotyto (none seen previously near). Reset traps. Difficult to tell Sylv. use from C. l. - Bgr & Sals. genlly not cut adjacent by Sylv.; droppings differ but not always present. Recounted dogs in some census areas (results on overlay maps). // I saw a marsh hawk flying low over E. part colony, over bottom. about every 100 yds. landed in grass. No evidence hunting of C. l. One C. l. ran to burrow, but no warning barks & not in tho hawk landed 50 yds. distant; another remained resting on mound when hawk 50 yds. distant. // About 40 Hereford cattle grazing here today, mostly in Bgr bottom. // One C. l. nosed thru much Salsola apparently looking for something else. // Stom. contents of Sylvilagus seemed to be forbs only - perhaps Salsola & Chenopodium. // A psillid (spell?) fly commonly seen perched in mouths C. l. burrows (Stenopogon (breviusculus?). These ~~see~~ are flying-insect eating flies (Thatcher, Entomol. Dept, says).

August 18, 1955. Jim Lawrence, local rancher, says more Salsola this year than since drought of 1930's. G. E. Klipple says most since 1940. Lawrence says this is good feed, especially in spring. // Klipple considers anything over 50% utilization as heavy.

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Continued overgrazing here reduces ~~no~~ desirable midgrasses (*Stipa com.*, *Asm*), makes *Bgr* form sod instead of having bunch-grass form, then *Bgr* root crown breaks down. *Bda* increases at first because *Bgr* ~~favored~~ preferred by cattle & eaten more in spring (critical period for plant). // I saw a *Buteo regalis* perched on fencepost near 205 mark at 9:30 a.m. One *C. l.* on mound 50 yds. distant but appar. not giving alarm. In census area II, counted 5 (3 farthest SE apparent juvs.; 2 at farthest burrow). (None at C 2 in B'M where I shot recently). One trapped (♀ 13 9) at crater in NW corner of A'O. (I shot at & probably wounded one in N. part of CD and in E part of HE; shotgun). // In census area IV at 11 a.m. I counted 13, 10 being in area E. of knoll (Half of 13 on edge *Bgr* bottom); sampling vegetation here difficult as 2 swales run thru area, & importance & use of these hard to determine. (All bordering flat bottom have access to it too). // Watched a juv. cut *Salsola* stalks with teeth, several inches above ground, kept to mound. // In NW part of EA, a burrow apparently dug out by badger within past few weeks (not same as prev. one found here). No other evidence badgers entering colony. // At 5:15 p.m. I counted 11 in census area IV (4 being in CE & perhaps counted in area VI before. 5 in BI, 3 or 4 apparently juvs. // In old part colony (census area IV) several new burrows under edge of hedged low *Chrysothamnus* shrubs (Photoed two).

August 19, 1955 Started two college boys on range surveys in CPER Sec. 22 colony. // At 4:30 p.m. I saw 5 or 6 (3 juvs; in exclosure) in area IX. At foot of E. swale in V, gps. of 4 and 3. About 10 yds. out into flat bottom at N. side area II, *Bgr* dominant, seed stalks 8" tall, leaves 4"; but present are *Chenopodium*,

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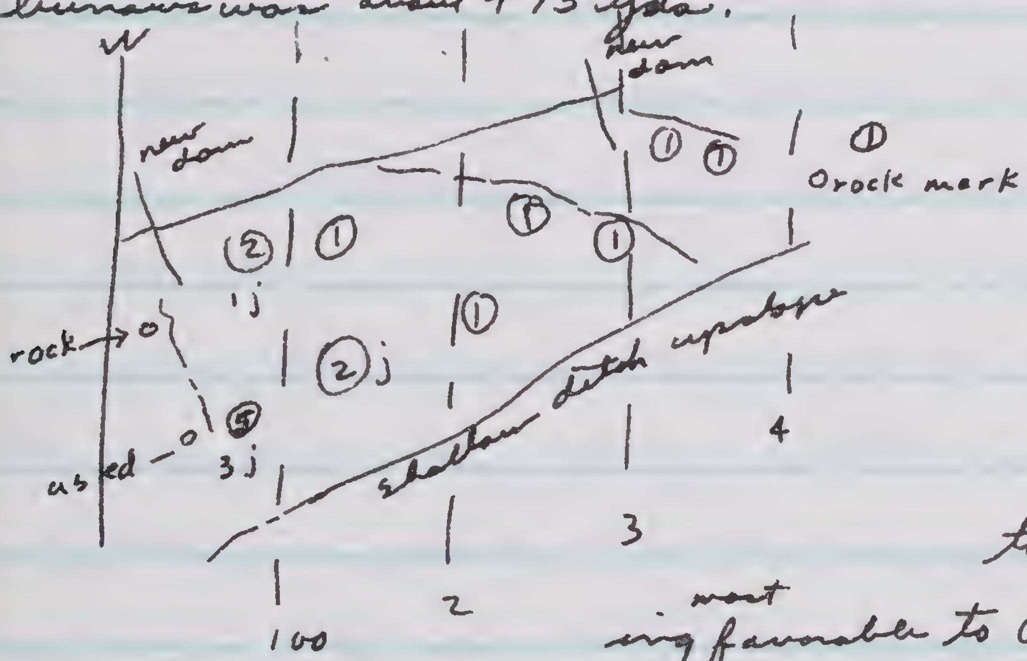
August 19, 1955 CPER, Weld Co., Colo.

Solanum (prickly seed), Solan. triflorum, Verbena bract., & others.

August 29, 1955 Nr. Ft. Collins, Colo.

Visited the Dumps colony in forenoon and eventually counted 16 C.l. there (about 7 juvs.). These were spread the entire NW-SE length of the colony, all on the usual slope (SW), none near the bottom or high on the slope. The linear distance from end to end of used burrows was about 475 yds.



I found no diggings for food, and no obviously new burrows. Old burrows outside of present to N & S, habitat appearing most favorable to C.l. to N. Where most dogs, area generally ~~bare~~ barer with greater proportion of short grass (Buchloe) than elsewhere. Patches Bda frequent, a few yards across; otherwise Salsola 1' high is dominant, & is thicker around area of town. Ska also cut at many sites; some fresh cuttings; some C.l. appeared to be eating Ska. // Veg. in S. 100 yds. was Ska, Bda, Asm; T. of Mto, Aristida. Next 100 yds., Bgr ~~also~~ present, & T. of Bahia and Chenopodium. Ska, Bda still dominant. From 2-300 yds. similar, + some Sphaeralcea. 3-400, Ska dominant, Asm common; relatively little Bda, some Kochia. 4-465 (farthest N. seen used), Ska, Asm, + T. of Bda, Bgr. Forbs on mounds dead and gone save Ska & T. of Sphaeralcea. Bgr, Asm are curing. Used burrow (not recent?) about ~~8~~ 40 yds. NW of where northernmost seen; old Ska cuttings there. No apparent vegetational, slope, or soil barrier

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to NW (old burrows) (Sals. & grass taller in genl there, but no obvious compos. diff. from occupied area). Asm without seed stalks (not produced apparently), but Bgr & Bda have. ē Opuntia, Mammilaria, Eriogonum prsnt. // I took step-loop density N. to S. for 240 pts. On basis 100 pts., result: Bda 38, Ska 15, Asm 2½, Forbs 2; total hits 57. In central area (100 pts) Bda ran about 50%. // Visited Sec. 3 colony, horse pasture 1 mi. S. of dumps. Weed growth, Ska especially, made counting difficult. Liatris in bloom (purple), & on wet sites two kinds of Solanum. ~~&~~ 1½' tall Euph. marg. in low wet spots & on bank of irrigation ditch upslope from census area. // at W. ⅓ of census area, Ska about 1' tall in open stand; much burrow repair; fresh cuttings Ska (also of Chrysothamnus). Little grass (Bda ½" tall, thin, in patches; doing poorly). On mds. Ska mainly, but some Sphaeralcea, Amar. blitoides. Sol. trifl. & Dys. pap. present. Much Asm in wet lower (downslope & ditch) parts. Iva still present but not thick or dominant. Found dead & dried juvenile. // In central area, estimated est. 75% bare, but Sals., Iva present, & ~~a few~~ some small patches Bgr. (Mud in bottom dammed area). Two burrows atop W. half of earth dam (4' thick). Asm in wetter sites; ~~&~~ Traces of Dys. pap., Dist. stricta, Euph. (geyeri?), Sphaeralcea, Astragalus, Bahia, Sol. trifl. Soil is clay. Upslope, Asm present but sparse; single stemmed; no seed stalks. Vigorous growth Ska & other weeds (Dpa, SOL, Eup. marg., SALVIA, ASClepias) on uphill edge slope ~~at~~ on lower bank irrigation ditch, & much cutting of vigorous dark green Ska here. Water in ditch. // S. ⅓ of census area has much Ska, & Iva, also Bahia, Dpa; small patches Bgr & Bda (thin, 1" tall). 1 mound much (purple flowered) Solanum. // I took step-point density along

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222
~~176~~
~~150~~

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August 20, 1955 Nr. Ft. Collins, Colo.

contour about 10 yds. below irrigation ditch bank, 170 points (1" loops). Results, on basis 100%: ~~46~~ 27 veg. hits; ~~of a~~ Bda 16, Ska 7, Asm 2, + SOL, Dpa, Bgr (2 total). //Bare area crater where much fresh construction, Chrysothamnus brush undermined at sides, and many shoots cut, so only about 8" tall.

August 21, 1955. At 11 a.m. of clear day, at Sec. 3 horse pasture SW of Ft. Collins, saw 16 C. l. in 2A census area on N-aspect slope. These fairly evenly scattered halfway between fence & paralleling irrigation ditch. None close to ditch or close to fence. //On opposite (S.) slope where no irrigation ditch or dam, fewer C. l. Here Ska 1-1½' tall dominant, more than 50% bare ground. Asm stalks very [illegible]. Small patches Bda & Bgr, much of it dead stubs only, & not over 1" tall. Also present: Cur. lan., Atriplex, Bahia (Fresh Ska cuttings.) Dys. pap., Psor. ten., Sphaeralcea, (Some sites Dpa 30% of veg.). Chenopo. alb., Iva, SOL. A little Muhl. tor. Dpa on some mds. /Walking across this slope, on contour (5-10%) I took 100 loops (step-pt.); 27 hits of which Bgr 10, Bda 2, Asm 2, Mto 1; Ska 7, Dpa 2, other forbs 3. (Some forbs (as Lappula) now dried up & gone; also Lepidium.) This count in area where many burrows. //Then visited Sec. 4, where a barley field bordered unploughed flatter ground. On N.-aspect slope in barley, barley sparse & not harvested, & several C. l. seen same burrows as earlier this year. More burrows than this spring; many new & shallow; some [illegible] for food. Mounds large (clay). Barley cut 10 to 20 yds. from some burrows. Ska prominent in field now. 1 mound 8' wide, 1½' thick, of mixed fine shale and clay. ~~Barley ll~~ Ground in vicinity burrows

Cynomys ludovicianus

August 21, 1955 Nr. Ft. Collins, Colo.

estimated 80% bare (Ska + green 8" tall barley dominant). Also T. of SOL, Polygonum, Chenopodium. //at upslope edge of this field a rocky untilled slope about 30 yds. wide + 30% grade. C. l. burrows at base, but dogs have not ascended into milo field at top of slope (a few possible old mds. there). Slope has Bout. curt., Andropog~~lop~~on, Stipa, Bout. sar., Aristida, Asclep. pum.; similar to uninvaded slopes in Black Hills. //Western part of barley field ploughed up in summer + planted to milo. Now milo to 3' high but not close stand. Much cut by C. l. (to 3/8" diam., green) at 3-8" height. Seeds present, soft, but no evidence eating. Apparently do eat tips leaves milo. Forbs in milo field: Amar. blat., retrofl., + graec., Ska. Fresh cuttings Ska some sites. Occas. milo stalk, tall, left next to burrow. //Unploughed bottom still has many dogs; 4 to 8/A on some acres. Much Ska there, + much cut. Much tall Euph. marg., rarely cut by C. l. tho 2' tall on edges some mds. at least 50% bare ground. Also present: Asm, Amar. gr., Rosa, purple SOL, Chenop. (some on mds. too), Astrag., Argemone, Sphaeralcea (mds.), Polyg. (mds.), Applop., Sol. trifl., Dys. pap., Euph. (geyeri?), Am. blat., Verb. bract., Am. retrof. One md. had Rosa, Opa, Euph. marg. No grazing this area now (or this year). Much cutting nearly all Ska to about 8" nr. some burrows. Some burrows (new?) in cones dirt accumulated at base Chrysoth. bushes. Some Chryso. cut. // S-facing slope that was ploughed summer now also has milo 2-3' tall + rather thin. Also in field: avena, Ska, Abl, Ska, yellow SOL; 90% bare. Little invasion

Koford ~~178~~ 228

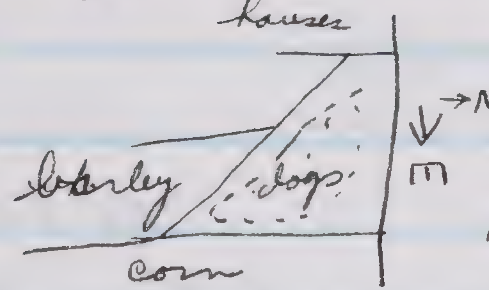
Cynomys ludovicianus

August 21, 1955 Nr. Ft. Collins, Colo.

this field. None on top hill (where early this yr.). One burrow 30 yds. in from N. edge, & milo cut to 15 yds. upslope from, but in gen'l less activity than on my last visit when milo just starting. (C. l. happy in Skea on unploughed area?). //One md. had on it 1½' tall Cirsium, not cut.//

Norton Co., Kansas

August 22, 1955 About 10½ miles W. of Norton, on S. side of highway 36 (¼ mile E. of ~~Norton~~ Norris Grain Co. elevator), a town bordered by cultivated fields. Town about ¼ mile long in half of a quarter section.



Many meadowlarks and burrowing owls (10±). At least 10 C. l. per acre. Three cattle now in pasture. Grass mostly dry now. Bromus (esp. at NE corner where no dogs), Aristida, Bgr, Bda. Clay soil. 2-5% E. slope. Mds. rarely over 6" high. Kochia growing on one. 90-100% cover of short grass hiding ground. Forbs present: Verb. bract., Kochia, prickly ~~So~~ SOL, AMA graec., Psoral. ten., Ambrosia, Sphaeralcea, Chenop. alb., Asclep. pum. Adjacent to cornfield (4' tall) but none in field, nor burrows there. Mds. close together - 6.6 yds. ave. min. spacing for 10. Barley (dry) on S. side field. Burrows in field near fence, & grain cut to 50' into field. (Prob. no current use grain in field.) Clumps Aristida (to 10" tall) near burrows. Tall thistles (Cirsium) uncut. Bgr. - Bda about 3" tall. Short grasses scratched out to bare earth around mds. One crater covered 2-4" deep with scratched up dry Bda; hole too covered with this. Bda had leaves to 6" long (longer than heretofore seen). //About 1½ miles to E. this colony, another on S. side road in cattle pasture. Rollin Baker told me there was a town S. of Haigler,

Cynomys ludovicianus

August 22, 1955 Lawrence, Kansas

Neb., but in Kansas. // E. R. Hall says that George Halozon, Kansas State Coll., Manhattan, knows about present rodent control in Kansas (with Ag. Extension ?). Fish & W.L. Svc District Agent for Rodent & Pred. Control is W. O. Nelson, Jr., Oklahoma City. At Garden City, Kansas, a Game & Fish Dept. biologist, Marvin D. Schwilling, should be well posted on rodent control matters.

August 23, 1955. Rollin Baker told me of Cyn. mexicanus in southern Coahuila. Lives in broad bottoms valleys between mts. ranges. Nearby are Cratogeomys, Spilosoma. Heavy grazing in area. Discussion in MS (Baker) on Mamm. Coahuila. //

August 24, 1955 Near Sharon, Kansas (Barber Co.)

Visited Ronald C Smith on Plum Thicket Farm and a 115 A town he has been studying since June. At one site near a dam he has counted 44 dogs in one acre; these eating leaves of yellow-flowered Solanum ~~Xanthium~~ mostly. At adjacent site where Bda-Bgr turf, eating mostly Bda now (especially stolons), but in June ate Bgr heads and Hordeum heads; 24/A there ~~Four~~ (Of the 24, 6 believed juvs.). Four burrows connected underground; these spread about 35 yds. on surface. Ron says Aristida longiseta definitely cut by C. l. on one hillside. Much Euphorbia marg. in lawn areas; apparently not cut, nor tall Cirsium. Many meadow larks feed on town. Badgers seen - up to 2 grown + 3 juvs. at once. Badgers entered burrow where 12 dogs known to be. Apparently only 2 survived. Badger on occasion seen to chase a C. l. C. l. usually bark while at burrow mouth when badger nearby. // Short grass about ½ green now,

Cynomys *ludovicianus*

Kansas.
August 24, 1955 Nr. Sharon, Barber Co.,

I saw 2 *Lepus calif.* on town at 7 p.m. Smith says common, & *Sylvil.* common where *Euphorbia* thick. // Smith has seen cattle tear ups *C.l.* mounds with feet. (This may lead to repairs ~~that~~ make mounds larger.) He says Loyd Amsden says many bald & golden eagles here winter. Ron says many Marsh Hawks, but not bother *C.l.* Some Swainson hawks around (I saw 2) but not known to harry *C.l.* Colony Smith studying said by 1 local resident to have been there 20 yrs. at least. / Two small colonies about 4 miles from there said to have been there only ~~3~~ about 5 yrs. Migration from Smith Colony? // On town, dried *Lepidium* & other weeds. On mds. *Amaranthus* (sp.?) common & still green on many mds. General cover short Bgr-Bda, patches *Aristida*, some short-cut ~~spr~~ spreading bases *Andropogon* *scoparius*.

August 25, 1955. From vicinity Smith's blind I saw a few out about 6:15 a.m., ~~slo~~ at about sunrise, many out at 7 a.m. Smith had numbers using each burrow well spotted. From one burrow emerged 2 adults and 6 juvs. (this bur. said to be connected to 3 others). Smith said that on one W. slope dogs had cut *Aristida* around burrows & had cleared it from a considerable area. // Floyd Amsden said that occasionally a *C.l.* had been seen on road on his ranch, where grass is tall, but that no burrows had been found there. // On study area where Smith now has blind #1, 35 burrows in area of 1.797 A, where 24 *C.l.* now. Another area of 6.1 A. includes a Bda bottom. This has 75 minimum (Blind 2 area) *C.l.* and 126 burrows, but no burrows on flattish bottom. Ave. min. spacing for

Cynomys ludovicianus

August 23, 1935 Nr. Sharon, Barber Co, ~~Fet~~ Kansas

10 consec. spaces betw. burrows at E. edge of bottom = 27.3 ft. (x15' to 36'), these being comparatively close spaced. This in area of *Aristida*. Smith's map shows burr. espec. dense in areas *Aristida* here (why? low visibility?). This area (#2) also has more dogs on W-facing slope than on E-facing. In study area of Smith, many burrows on S-aspect slope, few on N. aspect, but "barrier" of bottom between. Some slopes where many burrows had mod. amt. *Andropogon*, grazed to 1-2" tall, & some *Bout. curtip.* Some conspicuous plants of *Proboscidea louisiana* near burrows (not eaten). Apparent cutting by *C. l.* of many seed stalks *Andropogon* and *Bgr*. On W-facing slope near blind #2, at upphill edge of *C. l.* activity *Bgr* seedstalks become prominent; where *C. l.* have fed, these stalks gone, & tallest grass is *Aristida*. Ron Smith very sure that dogs have opened up areas a few feet across in former thick patch *Aristida*. These "holes" now have short *Buchloe*. Little evidence cutting entire ~~tufts~~ *Aristida* found by me. // The common prickly forb here is *Solanum rostratum*, now dry & leafless but 1 ft. tall. Seeds in prickly pods (many empty on ground). Occasional green plants of *Proboscidea louisiana*, but apparently not eaten by *C. l.*

August 29, 1955 Sunrise about 6 a.m. I watched area just S. of dam, where Smith counted 44 last week. Many feeding there 6:15. 6 (juvs?) + 1 older ran to & into 1 burrow when a great blue heron flew over. At 6:30 I counted 24 feeding in the area (< 1 A). Two scratched at ground near *Aristida*, then gnawed at spot as if eating root. Most seemed to be picking up seeds (?) from ground (seeds *Solanum rost.*?). // Smith has heard coyotes in area but has seen none or sign on *C. l.* town. He has seen turtle go in unoccupied burrow. 6:50, I counted 34

Cynomys ludovicianus

August 26, 1955. Nr. Sharon, Barber Co., Kan.

in the 1A. area (not all of it in view); another dug for food. By 7:10 I counted up to 37. Belt of Euphorbia marg. avoided, but several at edge bottom where Bda grew. At least 3 seen to stand + apparently eat at seed pods on Sol. rostratum. One killdeer, 1 Sylvil. in this small area (7:15 a.m.). I set 3 steel traps this area 10 a.m. + ~~took~~ removed & killed one ♂ (139) about 12:45 p.m. // Smith says he has seen no Speotyto here tho Mr. Amsden says they were here before (poor reprod. last yr ?). Smith also says he has seen C. l. catch grasshoppers. // One area on 5% N. slope seemed to be fairly new occupancy (was already inhabited in June). About 50 yd. diam. area has grass cut short, but taller in surrounding zone. Within area about 75% cover estimated; of this, forbs 5%, Bgr 80%, Bda 5%, Andropogon 5%, Aristida 5%, T. Bout. curt. (= about 40% by SCS condit. class ratings; CBK est.). This area separated by 20 yd. wide belt taller grasses (much Aristida, Sol. rostr., Bgr, Bcu, then another area short cut grass 30 yds. wide, + a similar roundish area adjacent. It would appear that dogs from these 3 areas did not intermix much. Smith believes none in latter 2 areas June, so perhaps little modified yet. // At Medicine Lodge visited S.C.S. office and Denzil J. McRae. He said this region had tall, mid, + short grass; Mr. Amsden had best examples, near 100% range condition. Drought had killed much Bda in SW Kansas. Succession: weeds first, then Aristida, then bluestem (kinds?), then buffalo grass (20 yrs. after land abandoned). Bda long in coming as not reseed quickly like taller grasses. High price cattle had brought on year round range use + overutilization. He thought education in range conservation much needed. Secured from him Technician's Guide sheet to range condition classes here (25 to

Cynomys ludovicianus

August ~~27~~ 26, 1935 Nr. Sharon, Kansas.

29" rainfall). He thought *C. l.* town sometimes ~~for most to~~ extended area because of lack of food old site (eaten by dogs + cattle). // About 12 traps I set among burrows on W. slope last night took 2 *Peromyscus maniculatus* + 1 *Onychomys leucogaster* (not saved); seed traps had bait eaten by insects. // Smith says *Cynomys* eat *Euphorbia marginata* when it was small. Also he has seen them eat *Solanum rostratum*, which is very prickly. Stomach of ♀139 contained many seeds *Sol. rostr.* and *Amaranthus* (graecizans?). // Some ~~burr~~ mounds ~~are areas~~ surrounded by B *Aristida*, Bda - Bgr outside of this. One area close to water-~~for~~ ing trough + windmill, heavy use by cattle + little but occasional *Amaranthus*, *Sol. rost.*, *Polygonum*, *Chenopodium*, *Euphorbia* (geyeri ?). (Some *C. l.* + burrows here. Photos Aug. 28) Cattle droppings every 1 to 4'. Outside this area *Aristida* increases, dominant; farther out, Bda-Bgr. // Ant mds. large here — to 4' diam., 1½' tall, + 15' diam. area cleared. Large plants *Proboscidea louisiana* often grow at edge of clearing. // One md. had large plant of a prostrate *Eriogonum* // On W-facing slope above Bda bottom, sites old burrows greener than surrounding areas (Bda). Upslope dogs present, more *Aristida*. Woody plant (*Artemisia dracunculoides* ?) cut (tops lying on ground), about 10" tall, near *C. l.* burrows (1/8" woody diam.). Prairie dogs rarely meet croton (1-2' tall), tho it common here. Where they do, they cut much of it. // In evening Smith found only 11 *C. l.* in area where he counted 24 about 4 days ago (area of blind #1). // Smith says at least 3 *Cit. 13-lineatus* on his area #1 (I saw one). *C. l.* vigorously chase these, he says, when they see them within 25' distance. Many times he has seen *C. l.* chase, catch, & eat grasshoppers (head first). Rod-

Cynomys ludovicianus

August ~~27~~ 26, 1955 Nr. Sharon, Kansas

gers can enter burrows without digging, Smith says. He searched for but found no remains C. l. after badgers in holes. // ♀ 139 + 140 had little in stomachs (5 to 12 gms.) tho taken between 10 + 12:45 a.m., + 1 + 2:30 p.m., respectively.

August ~~28~~ 27, 1955 Smith still found no more than 11 C. l. where 24 a few days earlier. // One problem is whether dogs increasing Aristida or decreasing it. Nearly pure Aristida in area surrounding some burrows. Adjacent Bda not especially vigorous, so probably Aristida increasing (Pasture heavily grazed by cattle). Area of C. l. surrounds area of heaviest use by cattle, + water (tanks, reservoir). Grass + croton taller where cattle seldom ~~graze~~ graze graze, + ~~few~~ no C. l. there. How to separate cause + effect, + effect greenery from effect grazing? // Formerly shooting of C. l. this area by local + Wichita people. // Principal plant on mds. now a prostrate amaranthus (similar to blitoides); probably others earlier. On low ground adjacent to 1 acre pond, burrows to 100' from water where ground at 4' higher level than water. Much Aristida there mixed with Bda-Bgr; main forbs Verbena bract. + Euphorbia (geyeri?). // At blind #1, slope 11% to S. I took a step-point (1" loop) plant count in spiral in area burrows. Plant density index 74. ~~Ratio pts. to veg. hits = 1.26 (126 pts.)~~. For 100 plants tallied, ~~veg.~~ ~~hits~~ Bda 53, Bgr 30, Chloris 10, Bout. curt. 3, Andropogon (silver?) or (big?) 3, forbs 1. Also present: Sol. rostratum, amaranthus (blit.?), Ambrosia, prostrate euphorbia, Aristida. // Area S. of dam where 44 seen by Smith has heterogeneous vegetation bordered by Bda-Bgr of bottom. About 25% max. cover. Bgr est. 25% of veg.; aristida ~~[illegible]~~ 10%)

Cynomys ludovicianus

August ~~28~~ 27, 1955 Nr. Sharon, Barber C., Kan.

Andropogon 5%, Bda 5%. Remainder forbs: Amaranthus, Sol. rostr., Polygonum, Euphorbia (geyeri ?), Geranium (?-perenn.; just starting?), Euphorb. marg., Mirabilis, Portulaca, Bahia(?), Verbena bract., Lepidium (now dry & mostly gone), Croton, Proboscidea, Argemone. // I put out a C. l. carcass near #1 blind yesterday evening. Today it is gone; carnivore tracks (badger? - no claws) at site. I took a Phrynosoma cornutum on dog town yesterday, & a Holbrookia was seen. // Near windmill & watering troughs were many Hereford cattle. Two C. l. seen at burrows on heavily trampled ground there. I photographed this area. Over next ridge to E. of windmill colony may be fairly recent. Much tall grass (= ? Panicum virgatum) had been cut before heads opened fully (not Androp.), & present grass only 3" tall after grazing. Many heads dry on ground. Burrows where about 50% of cover was bases this large grass (saved specimens). Croton also much cut here (isolated 2' tall plants), at height sev'l" above ground. Much Opuntia humifusa but no evidence eating this. // Apparently where ground cover 75% but short (3"), favorable for C. l. // Yesterday ♀140 in traps max. of 1½ hrs. in sun (steel traps), but dead, apparently of heat; wet around mouth, blood vessels black & distended; lungs bloody.

Wichita Mtns. Nat'l Wildlife Refuge, Okla.

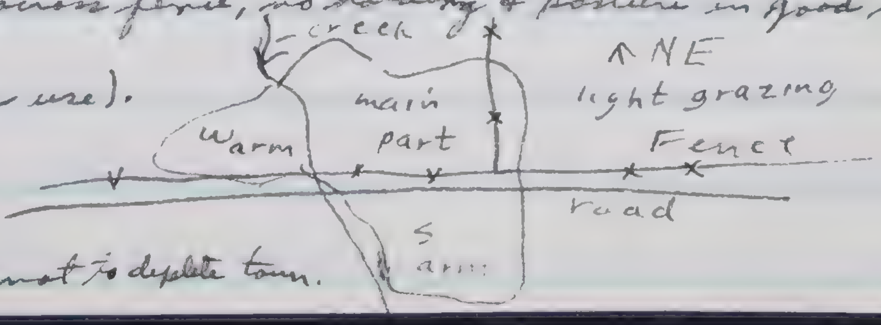
August 28, 1955 Near Turkey Creek is only present C. l. town here - called "Official town." Talked with Mr. H$\overset{2}{i}$tch? & another employee about C. l. here. Dogs had been removed from W. of Turkey Creek about 3 yrs. ago. This year they had crossed again. This town started in SE corner of holding pasture and then spread. Grazing had been

Cynomys ludovicianus

August 28, 1955 Wichita Mtns. Refuge, Cache, Okla.

extremely heavy there so hard to see what C. l. ate in winter. One man said now digging for roots here. He also said they are pushing into climax vegetation (bluestem) at one side. // One dog had been seen at the slaughter house, 1 mile from dog town. Another had been seen half-way up Scott Mtn., far from any town. // Another town was at Sulfur Flats. All killed out of there about 2 yrs. ago (near Cache entrance). At Fullingham Flat a town died out for no apparent reason; said now to be reoccupied. // Coyotes controlled here by 1080 bait & getters. Badgers apparently not present. Few rattlesnakes. Eagles (bald & golden) winter here, but not known to take C. l. Many Crotalus in 1930's. About 14 eagles on refuge in winter. // Last 3 yrs. here drought. This year about normal rainfall. // Oasis Ranch (Jack Hawenstein) just outside Cache gate has dog town. Jack should have info from about 1930 on C. l. // Julian Howard, who helped Osborn & Allan in study of Grace Mtn. town, now at Aransas refuge. Halloran, Biologist at Wichita Mtns., now visiting Aransas; back by Aug. 31. // Later talked with refuge manager Ernest Greenwalt. He took me on tour of C. l. sites. The official "dog town may have been here 50 yrs., fide Greenwalt who has been here since 1935. It has always occupied about same area. Several years ago population reduced by trapping & drowning, & dogs sent to Chicago (Anthony & Foreman) for experimental work. This colony in Sec. 17, in exhibition pasture mainly, but crosses a fence to E. & crosses highway, to S. It is located along Turkey Creek. Main part of town in SE corner of a holding pasture where grazing heavy. To E., across fence, no holding & pasture in good condition (longhorns, buffalo, deer use).

Taking dogs stopped about 2 yrs. ago so as not to deplete town.



Cynomys ludovicianus

August 28, 1955 Nr. Cache, Oklahoma.

About 2 yrs. ago no dogs left to W. of creek N. of road. This year (since Jan. 1) west arm reoccupied, to about 400 yds. W. of creek (where 10± yrs. ago). Small expansion to E. both N + S of road. // SCS holds a range school here + may have mapped towns in past. They have at least one transect in *C. l.* area (Fullingham Flat). // Three cases of vids being seen far from towns. C. G. saw one atop Scott Mtn. One seen near headquarters, 3/4 mi S.W. of official town. Another seen (more than once) near Grama Flat, 3-4 mi. from a town. Mr. G. said ~~the 3 he saw~~ the one on Mt. Scott seemed to be an adult, not young. All these wanderers seen in June - July, but no new colonies found. Why not? - hundreds of acres of apparently suitable ground. // At N. side of official town, native hay sometimes mowed. Where ground denuded, mainly due to dogs thinks C. G. // All again last 3 years were drought. (This killed many blackjack oaks). Now buffalo overstocked, about 1200, & too many weeds (ragweed *ambrosia* especially prominent), & "rosin weed" (*Grindelia* ?). In 1951 grass ~~unusually~~ good due to favorable distrib. moisture. Whole refuge is grazed. Where hay cut + where grazing heavy, tall & mid grasses reduced while Bda increased. Where formerly nearly pure *Bda*, under light grazing much silver bluestem (Andropo. sacchar.) has come in, & some little bluestem. Greenwalt says that after little bluestem comes big bluestem + switchgrass. In some areas these tall grasses 5' tall & dense, & mulch thick (mostly damper sites now). // Mesquite trees come in when grazing heavy (these poisoned with oil many sites), & some say mesquite assoc. with prairie dogs (Jack Matthew, local SCS man, for one). Examples are town at Fullingham Flat, & one 4 mi. S. of Cache on W. side road. // Grace Mtn. (Osborn - Allan) town mostly in *And. sacc.* mixed with *Bda.* Much evidence grazing there & no obvious evidence further encroachment of tall grasses from edges valley. Plenty of forbs & *Buchloe* for *C. l.*, I ~~then~~ think. Probably ~~all that~~ Allan & Osborn discussed was plant zonation around

Cynomys *ludovicianus*

August 28, 1955 Nr. Cache, Oklahoma.

a shrinking *C. l.* town. Reason for shrinkage unknown, but lack of food mere speculation. Some zones may have been due to effects *C. l.*, not to succession on denuded ground. Soil texture, depth, + moisture differ in bottom, where *C. l.*, from foot of slopes; grazing heavier too in bottoms; how separate these effects from *C. l.* effects? Matthews believes ground rarely entirely denuded; always remnants live *Bda*. ~~// Baker Mtn. to~~ E. G. says this town once extensive + thriving. // Baker Mtn. town borders refuge. Once large + with many dogs. It was intended to poison half, + 1080 put out. Result was excellent kill on entire town! (half moved into poisoned area?). Area of former *C. l.* occupancy now white with *Androp. sacc.* This area much used by buffalo - they like short grass areas (E. G.). Baker + Grace Mtn towns had long been undisturbed ("sacred towns"), until poisoning. // In 1930's (6-8?) drought + very poor pasture conditions. Much *Grindelia* now on Baker Mtn. town. // To N. of this town, outside refuge fence, land bright green because of near-pure stand of *Gutierrezia*. ~~Also~~ This continued 50-100 yds. up rocky slope (where good bluestem on refuge), + mesquite too grew high on slope (not on slopes on refuge). // Formerly *Speotyto* in refuge, then disappeared. A single one killed by car a few yrs. ago. No *badgers* here. Coyotes constantly controlled. // E. G. once saw *C. l.* at roadside eating a tarantula (3" across). // Fullingham Flat, some *C. l.* near mesquite trees. Poisoned once inside refuge, but still present outside. Gone 3-4 yrs. Now back (from outside?). In 1936-8, this site a dustbowl. // Sulphur Flats town invisible without close inspection. E. G. believes army people killed many dogs. Old burrows at fenceline, where hog-wire reaches ground. Longhorns grazing S. of game fence. At mouths old burrows *Bda* mainly, + outside of this *And. sac.*, *Bromus*, *Lepidium*. ~~So~~ ~~Bo~~ Grama + *Aristida* common. About 50% ground cover, 70% (est.) of

Cynomys ludovicianus

August 28, 1955 Nr. Cache, Oklahoma.

it Bda. Old burrows are depressions, mounds genlly not apparent (large mounds rare this region; damp soil so shallow & more stable ?). Old town both N + S of game fence. (Cattle drove me out). // Talked with Jean Matthews of SCS at Lawton. He corroborated much that E. G. had said. He ~~will~~ offered to spend a day with me this week. // E. G. says a town on Oasis Ranch (Jack Hollensteins) just S. of refuge.

August 29, 1955. Spent morning looking over populated "official" dog town. Map ~~p. 191a~~ 191. S arm: Dark gray clay loam soil. Low population - apparently none in SW 50 yds. of burrows. Grass cover Bda principally, but also Aristida, Andro. sacc., Bromus. Dead forbs - Plantago, & a broom-like annual, Lepidium. Green forbs - Ambrosia, Applopappus (some in yellow flower). On mds. - Verb. bract., Amar. blit., Polygonum (prostrate), Andro. sacc. (at mouth some burrows), Ambrosia, Sol. rostratum. On & bordering clearing around mounds: Sol. rostr., Schedonnardus, Aristida, Euph. (geyeri ?), Ambrosia (2" tall; stunted), Androp. sac. (2" high - heavily hedged), Erigeron (woody). (This arm extends about 200 yds. from road.). Abandoned mds. had much Ambrosia on some (perennial prob.); Bda and Asa on ~~older old~~ longer aband. mds. Close around burrows, Aristida, Chloris, Asa cut to 2" height. On W. side thick abrupt Asa borders Bda - C. l. area. Upslope to SE where no dogs, Asa, Bout. curt., Bout. hirsuta, Age & Asc. 1½' tall Cirsium & Euphorb. marg. not cut by dogs or cattle (cattle came in 8:30 a.m. & stayed here). Ants - harvesters in Bda areas have well defined bare soil trail an inch wide. Mound low but chaff surrounds, & green Aristida grows around area. Slope of occupied area 2% to W. // Game fence is 50' N of road; some burrows at fenceline & on thin Bda ~~outside~~ later fence + road. // In main part of town, SE corner of exhibition pasture, Bda about 95%; 80% ground cover (estimates). Barish spots have Applop., dead Plantago, Polyg.-

Clay loam - dark

On rds:

Verb. bract.

Am. blit.

Polygon.

& bordering

On clearing:

Sol. rosth.

Sched.

Arist

Euph. (gey.?)

Ambros -

In area:

Grass

Bdla

Arist

Asa

Forbs

Applop.

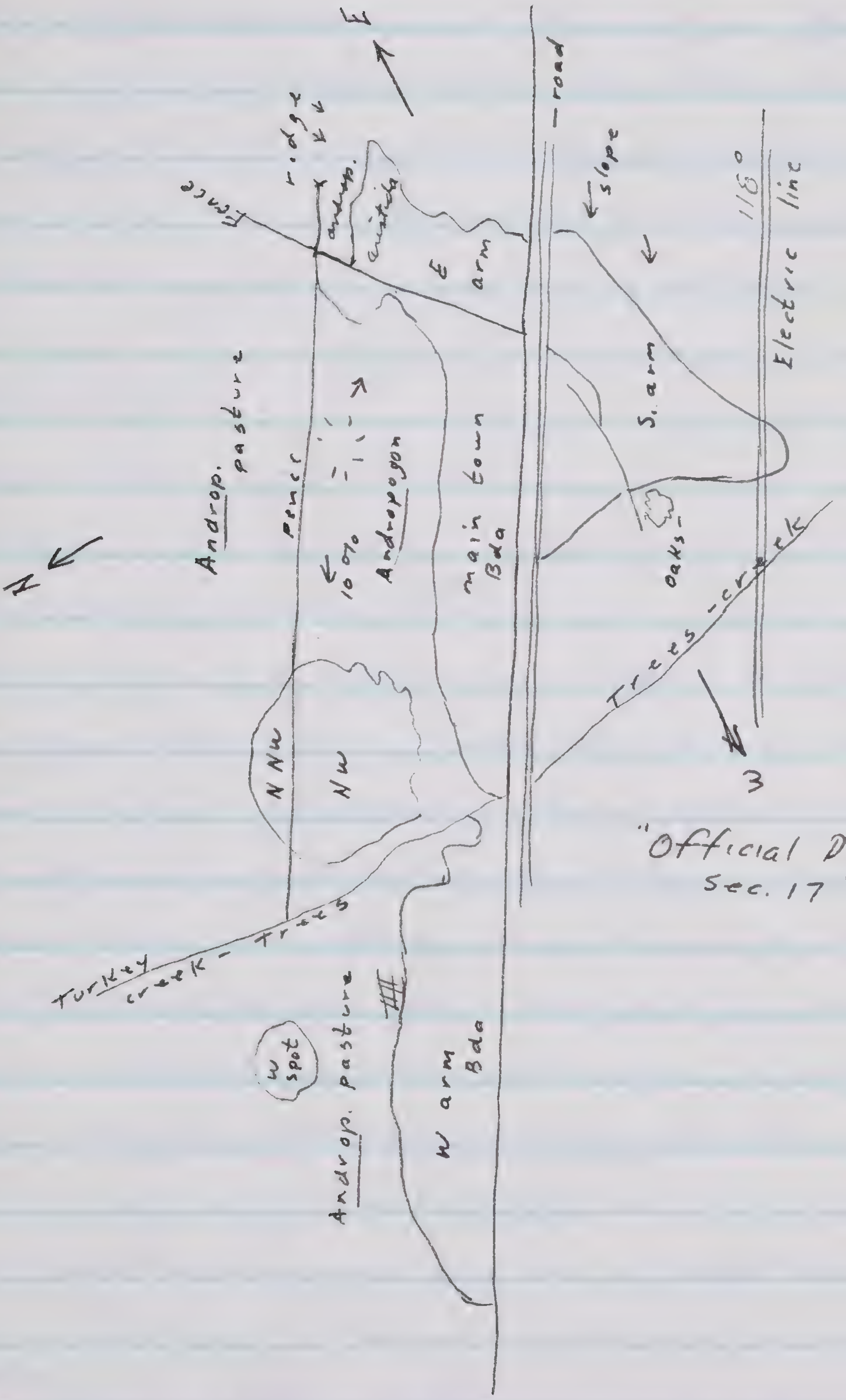
Ambros.

Lepid.

Koford 191

Cynomys ludovicianus

August 29, 1955 Wichita Mtns. WL Refuge, Okla.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fence
ridge
androp.
aristida
E arm
road
slope
110°
Electric line
Androp. pasture
fence
10%
Androgogon
main town Bda
S. arm
oaks
Trees - creek
N
NNW
NW
Turkey creek - trees
W spot
Androp. pasture
W arm Bda
S

"Official Dog Town"
Sec. 17

shrankia?
onion, finely divided leaved forb* (green), linear-leaved fleshy forb, Sal.* rostr., Euph. (geyeri?)*, Aristida*, Ambrosia*, Sphaeralcea (rare). Starred* are also close to burrows. Aristida & Amar. blit. on mds., especially Abl., large, spreading, prostrate. Ants & trails here too. Mounds not large 4' diam. & 8" thick about max. size. Upslope to NE, a belt of conspic-

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August 24, 1955 Nr. Cache, Oklahoma

now Aristida (Bda & Asa mixed), then nearly pure Asa. Some shallow swales a few feet wide have Bda bottoms, Asa between. Uncut close to rds. are Sol. rostr. and Cirsium 1' tall. Patches Asa several feet across in area Bda-Aristida. Then abruptly solid Asa on upslope side; rare burrows in this but some where near pure, covering nearly all ground, & 3"-8" tall. About 10 yds. in from edge Aristida, 2 new burrows about 6" deep where Asa 4-10" tall. Some burrows in Asa area are in patches sev'l sq. feet of Bda (= cause, or effect?). Two burrows, recent but not current use, 70 & 100 yds. from edge continuous Bda-Aristida, where Andropogon-Bcu 3-12" tall in genl. Throughout taller Androp. are areas of shorter cut Androp.; these may be favored by C. l. (or caused by them). Some And. gerardi & And. scop., and some Bromus, on this slope above C. l. level (dogs not above 5% here). I photoed ad. ♀ at burrow 50' out into Asa-Age. At mouth burrow ♀ cut 2 culms Age, 5" long, as I watched. Seemed to feed mainly on dry seeds or forbs on ground. Burrows to within 30' of fence to NE, but none at or beyond fence (less Bda & grazing there, but rather open & weedy). This group does not cross fence on ~~W~~ E. for 100±' at NE corner; to W. of fence thick stand of Andropogon (due to no invasion?). More to S. crosses fence to E, & much Aristida prominent there (probably due to C. l. rather than heavy grazing, as grazing light there. // East Arm. Light grazing. About 80 yds. SE of fence near center in amoeboid area 40' diam., of Bda & Aristida, surrounded by Andropogon. In center 10' wide mound with 2 burrows (much Amar. blit. on). In one line from there, then nearly pure Aristida for 2 to 6; then mixed with Bda; then Asa in spots & increasing, becoming pure 15' from burrow; then Age starts about 30' from burrow. Where C. l., <5% forbs, but some forbs in taller grasses (C. l. area - Lepidium, Ambrosia, Erig.,

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August 29, 1955 Nr. Cache, Oklahoma

Amar., Sol. rostr. An occasional old burrow to 150 yds. E. of fence, where much Bda, & old wallows grown over, but used burrows only to 100yds. from (& E. of) fence, E Bcu & Age mixed in Andropogon areas. Bda-Asa about 50/50, + Aristida, in C. l. area. Apparently invade Asa if short, even though covers bare ground. Population low in E. arm; many unused peripheral burrows. Irregular distribution with tall Andropogon (to 12" leaves, 2' stalks), + Bcu between. Asa dominant; Asc, Age present. Aristida common both E. & W. of fence, tho grazing pressure different (due former C. l. mainly?). Arist. to 100' from currently used burrows. Opunt. humifusa present. No current use in near pure Aristida, tho some ~~old~~ burrows opened. // C. l. favor Bda. Bison favor Bda areas. C. l. make condit. favorable for bison, & vice versa? Around isolated abandoned burrows is Bda for a few to several feet; cause or effect? // Knoll at N. side of main part colony surrounded by Asc, Age, Bcu, Asa, & some Grindelia, Gutierrezia; this area, 10% slope, gently with no C. l. In NW sector, many burrows on flatter ground toward Turkey Creek. This section separated from main part town by isthmus of Andropogon with some openings made (?) by C. l. Small swales a few feet wide run into C. l. area down slope from in 8-16" Andropogon. Grass cut shorter in these swales, & C. l. burrows in some to 75 yds. upslope from main Bda area, & Bda extends up these swales farther than in adjacent areas / so bands Bda with ~~short~~ Andropogon between. These swales thus may be caused by or may favor C. l. In this area Bda edge sharp against taller Andropogon on upslope side (no Aristida area). Apparently breaks in uniformity of Andropogon cover favors C. l. - grazing, car tracks, ant nests, wallows, swales. C. l. mds. tend to be

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on top long ridges between *Bda* swales 5 yds. apart (ridges 6" higher). NW area barer than main part or E or S arms colony, but still much *Bda*; most burrows / unit area, & most cactus. Max. slope where *C. l.* is only 5%! area looks brown in general. Some *C. l.* diggings to 3" deep (finger sized holes leading from bottom two). One digging had stub 1/8" diam. root. Paced ave. min. spacing between 11 burrows – only 8.1 yds.! Largest mounds, old, spread 8' wide, 1' thick. Few over 5' diam., 10" tall. Flattest area toward creek had much *Age*, no *C. l.* (water ?). Creek bank shows soil holds vertical cut. A whitish (lime ?) layer 5' below surface. Upper few feet silt loam with some sand particles. To N. of fence at NW side: a 1946 map shows colony ~~extended~~ here (also across road to S, (S. arm) & into pasture to ~~E~~-E. arm). Slope about 2%. Invaded area of hay pasture (native) about 80 yds. to N. & 150 yds. wide. In invaded area *Bda*, *Ambrosia*, & much *Aristida*. Cleared area abuts *Andropogon* stand. About 10 yds. into this, where short, ~~we~~ saw 2 recent burrows. Beyond, grass 10"-16" tall in genl. Some well developed mds. at junction of *Bda* & *Andropogon*. Some mounds 50' into *Andropogon* (grass beaten down & patches Bda near). Many burrows in *Bda* area of main invasion. // Poisoning with 1080 in 1946 & trapping, flooding, & poisoning at other times make interpretation of status towns difficult. // *West arm*. Populated to extremity of burrows, about 1/4 mile W. of Turkey Creek. Main area within 100 yds. N. of fence (aerial photo taken 3/21/42 shows bare there). Most of *C. l.* area is thin & poor *Bda*. Forbs: Plantago, Hedeoma, Ambrosia, narrow-leaved Portulaca (?), & others. Another area about 50 x 75 yds. separated by 100 yds. of *Andropogons*, to N. (see maps). I saw one run 10' to burr

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saw carrying green food in paw. Two seen at short range were large. Burrows in dog area close, (showing long use?). Main area bordered to N. by Asa mainly. Some evidently old mounds, half covered with Bda, half with Asa, reoccupied. Ant paths & nests here in Bda. Possibly 2 new burrows about 50' to W. of evidently old ones. Farthest west one 60' short of dead mesquite tree stub. Slope 5% to E. At edge one area, much Grindelia had been cut (now dry); 18" tall, 1/4 of ~~bo~~ stems of some plants cut; ~~som~~ some Asa seedstalks also cut & now prostrate. From burrows on E. side to those on W. side of creek only 75 yds., & ground open between, creek being only rounded depression here, so no barrier. // At office I was told of apparent new town near Grama Lake (in SE 1/4 of Sec. 25). Greenwalt had seen 1 ~~last~~ this summer near Comanche Lake (in NW 1/4 Sec. 1). Other wanderers seen about 1951. // Another town is located 1 mi. S., 2 mi. W., of Indiahoma gate. // Records showed 1080 poisoning in May - June 1946 at Turkey Creek, Baker Mtn., Sulfur Flat, Fullingheim flat, Cut-throat. Two dead turkey vultures found on Baker Mtn. colony after poisoning by ranger Carl Drummond. TV's seen to eat dead C. l. Aim was to kill about 1/2 dogs on these towns. By July 1, 1946, few left at Baker Mtn. town. // Wallace Kirkland and Hal Harrison, photographers, both photoed C. l. here; Kirkland had some in Life Mag. about 10 yrs. ago.

August 30, 1955 1.72 inches rain & hours of thunder & lightning last night. Prairie dogs busy repairing mounds. Scratch soil with forefeet, then push it back with hindfeet, while facing away from burrow. Then turn & drive forward using forearms as basket to push dirt. Assume stiff legged stance & tamp with blows from nose. Some get mud packed on rostrum

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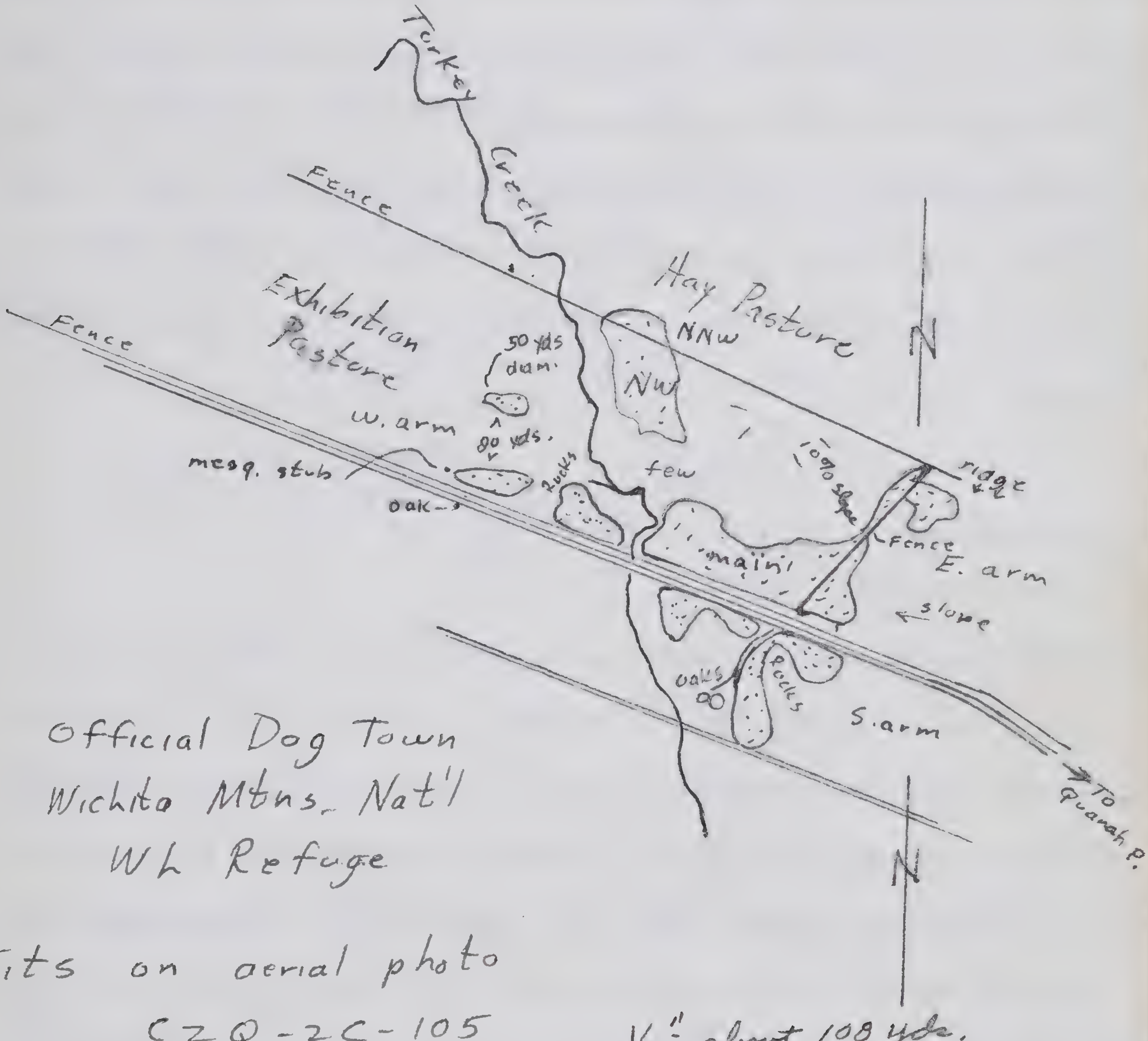
August 30, 1955 Nr. Cache, Oklahoma


Turkey Creek
Fence
Hay Pasture
NNW
NW
Exhibition Pasture
Fence
50 yds dam.
80 yds.
W. arm
mesq. stub
oak
Rocks
few
10% slope
ridge
Fence
main
E. arm
slope
oaks
Rocks
S. arm
To Quanah P.
N
N

Official Dog Town
Wichita Mtns. Nat'l
WL Refuge

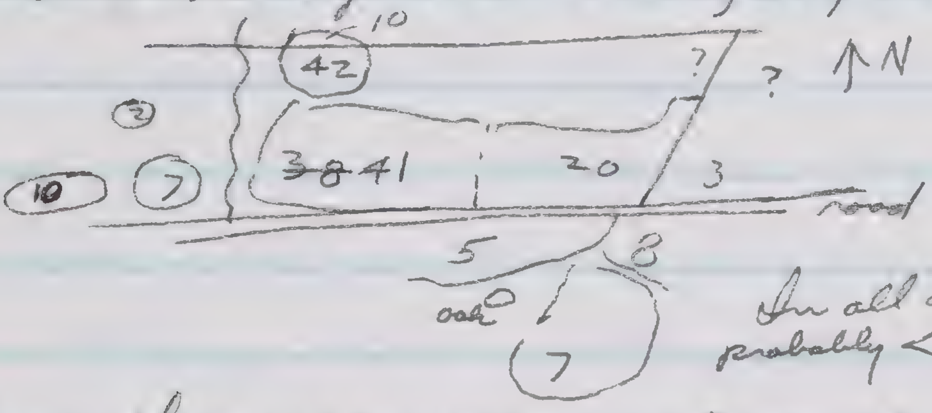
Fits on aerial photo
CZQ-2C-105
3-21-42, 12"

1/4" = about 108 yds.

Cynomys ludovicianus

August 39, 1955 Nr. Cache, Okla.

but seem not to mind. Saw one chase about & catch insect — possibly grasshopper as many here. As many as 3 at a time repair same mound. // ~~Up to 3~~ about 5 *turkey vultures* stood on mounds. One ate at apparent cow dung. Several *C. l.* ran to burrows when a vulture flew 50' overhead. // A few crows on ground near colony of *C. l.* // I counted dogs about 9 a.m., sky overcast.



(see map. p.196)

In all about 155 counted; probably < 200 present.

In W. area, the 7 and 2 in areas about 1 A. each. In NW part, 10 in about 1 A in N. extension, 42 in about 3 A. of rest. Maximum density about 15/A. Up to 5 seen gathered at 1 burrow in NW area. Only 2 or 3 seen surrounded by *Andropogon*; not feed there for most part. // At 5:30 p.m. recounted parts of official town and got a few more (3 or 4) on some sites, less on others. Increases included above. // I visited town 1 mile S. & 2 miles W. of Indiahoma gate of refuge. Colony of about 4 acres confined to flat (< 5% slope) where 30± mesquite trees to 15' tall, 12" diam. Took photos. Notable was fact some burrows under trees in shade (crown 6' above), even in shade between trees, & some within 3' of tree trunks. Lawn-like (mostly dry) cover of *Bda* (about 75% cover), *Bda* 3-4" tall & making up 95% of plants. On mds. was usual *Amaranthus blitoides*, & *Ambrosia*. Some tufts *Andropogon*, cropped to 3" height. Small ants. *Aristida* & grama in central area. Prostrate *Euphorbia* on bare area near mounds. *Aristida* mainly at periphery area where no *C. l.* active burrows. Area surrounded by *Gutierrezia*, increasingly thick away from town, 1½' tall, & giving bright green aspect to rest of pasture. Cattle grazed nearby. A small

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August 39 1955 Wichita Mtns. WLR, Nr. Cache, Oklahoma.

dam + pond, & shallow streambed. Much of C.l. flat of same slope & aspect but not occupied, having Gutierrezia. Is this a barrier to C.l. movement outward? No signs of cutting Gut. tho B. gracilis seedstalks cut nearby. Andropogon (Asa, Age, Asc.) & Bout. curtip. common in peripheral Gut. area. In peripheral zone of Bda no apparently much used or well-mounded burrows. Nearly all burrows among mesquite or within 20 yards of it. Aristida at edges some mds, & 3-leaved prostrate forb (=?); Plantago & bush Erigeron (?) also next to bare areas. Some Physalis on abandoned mds. No obvious use burrows within 100' of edge of Bda zone, tho some old burrows to 15 yds. from Gut. zone. Do Cynomys eat seeds or seedlings annual Gutierrezia? - much of it near & under mesquite where no C.l. No mesquite young trees, except 6" high, in C.l. area here ~~as nearly~~ (due grazing or C.l.?).

August 31, 1955 Visited reported new colony NE of Grama Lake (see p. 187 maps). About 200 yds. bearing 128° from windmill, a dead mesquite with 5^{0} yd. diam. area Bda, very short, around it. 3 burrows in this clearing. Perhaps made this year, but not currently used. Apparent C.l. droppings next to one. Clearing bordered by tall Ambrosia and Androp. sacc. // Grace Mtn. town. Area B, shown in Ecology 30: 224, 1949, near where car trail crosses bottom. Muddy water holes & heavy stock use of this bottom. Other wallows + ~~a~~ few mesquite trees included. On W. side bottom, 50 yds. up slope, depressions apparently indicate old burrows. Here Androp. sacc. dominant, ~~1½'~~ 2' tall seedstalks, mixed with sedge, gummy Eragrostis, Chloris, Ambrosia, Bout. curt. Where flatter, nearer bottom, mostly closely grazed. Same plants + Age & less Asa. Moderate Grindelia, areas of Bda, occas. fall witchgrass (?), woody forb. This has much Bda now & still rather open. Nearer bottom more ~~Asa~~ Bda, + Asc, tall dropseed (?) thick. Probably much advanced in succession since C.l. present. Jean Matthews, SCS, Lawton, went over ground here with me. He thought area B had much more taller grasses on it than in

Cynomys ludovicianus

August 31, 1955 Nr. Cache, Okla.

about 1948 when he first saw it (no C. l.). Very short grazing of Oga + others apparent in spots of several square feet (Matthews says this common with stock; return again + again to grazed spot + pass up tall tufts nearby. On other area J. M. says Androp. scoc. has increased greatly since 1948. He believes, given time + light grazing, all of this bottom could go to ~~[illegible]~~ Asa. // In bottom near center of Area A (Osborn, Allen article), a dense patch several square yards of Panicum obtusum. Some Triodia (albescens ?) also present. // In general, J. M. says that more Gutierrezia this year than for a long time, even in some good pastures. Worthless as cattle food. He also says ~~that~~ denudation by grazing is rare. area usually goes to Bda. ~~Grama~~ Bgr decreases with heavy grazing. // We looked at area of Baker Mtn. town. Mostly Asa but considerable Asc now, + gen'lly better than Grace Mtn. town area, we thought. Probably neither yet a "good" pasture condition by SCS rating. (Soil in bottom of Grace Mtn. is deep ~~sandy~~ silt loam). J. M. knew of no slope aspect diff. in range vegetation here. // We looked over "official" town. a Common prostrate forb here is sensitive brier (fine mesquite-like leaf). Much dead Plantago [illegible] on W. slope, + little Aristida; some Schedonnardus; patches Asa; ~~some~~ many patches Opuntia (possibly C. l. nibbled fruits earlier this yr). Many large grasshoppers (3" wingless too ones). J. M. estimated that adjacent bluestem pasture to N. of NW part colony + upslope to E. of it as a "high good," with spots "excellent". He said there had always been Aristida on S. slope of main part colony. Sphaeralcea found but rare. // Saw 1 C. l. eat tip of Bda stolon. In bottom of fresh digging (3") found stub of root 1/8" diam., smooth surface, thin tan skin. // J. M. then showed me town about 600 yds long + 200-300 wide in mesquite grove bordering alkali flat, 4 mi. S. of Cache (NW of road corner). At SE end, ground slight slope + patches of 100± sq. yds. where Sporobolus [no = ?) airoides dominant (= Sai). This, Matthews said, was an

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~~August~~ August 31, 1955 Nr. Cache, Okla.

alkali flat. Main forb over town was ~~a~~ fleshy 3" tall ~~plant~~, Portulaca-like, narrow leaves, = Gossypium ? cottony at tips. I did not ~~not~~ note any of this to be eaten by C. l. Many mesquite seedlings a few inches high. Tips & leaves of many seemed to have been nibbled, probably by C. l. None from 1' to 5' tall. C. l. eliminate ? - perhaps eat in winter, or eat seed. Other common forbs: prostrate Euphorbia (supina or maculata ?), Amaranthus (graecizans ?) (especially on mds.), Solanum rostratum (green; some in flower), Physalis, Croton, Amar. blitoides (huge, 1½' across, on mds.), Plantago (purshii ?), Aster ericoides (possibly called woody Erigeron earlier notes here), dead ~~[illegible]~~ Linum (slopes espec.), much ~~Hoffmanseggia~~ or Schrankia (sensitive briar). Large patches Bda ½" tall. Aristida occasional; not large solid stands. Many ants. No cattle present apparently (Sporob. air. otherwise would be grazed short). Some burrows on naked soil where heavily water washed. Many C. l. seen (6+/A?). New burrows in nearly pure Sai 4" tall. Some abandoned mds. had much Portulaca, Sai, Euphorbia on them. Many mounds at base mesquite trees so soil covered part base. Many holes alongside base trunks. Many trees with 3" deep ditch around base ½ or ¾ of the way, evidently dug by C. l. (droppings) (for food?) In purest Sai, few burrows, tho grass short. Apparently favor bare areas for burrows as 8 in one bare spot had ave spacing of 4 yds only. Many handsome symmetrical & tall craters. Out of mesquite, where most burrows, they continued up on E. slope (possibly 10%) where much dead Linum, & Bda ~~Bd~~, Aristida, Asa, Aster eric. Gutierrezia starts 30' outside peripheral burrows (little or no mounds); & 10' farther out is 1½' tall (this upslope side). Soil a

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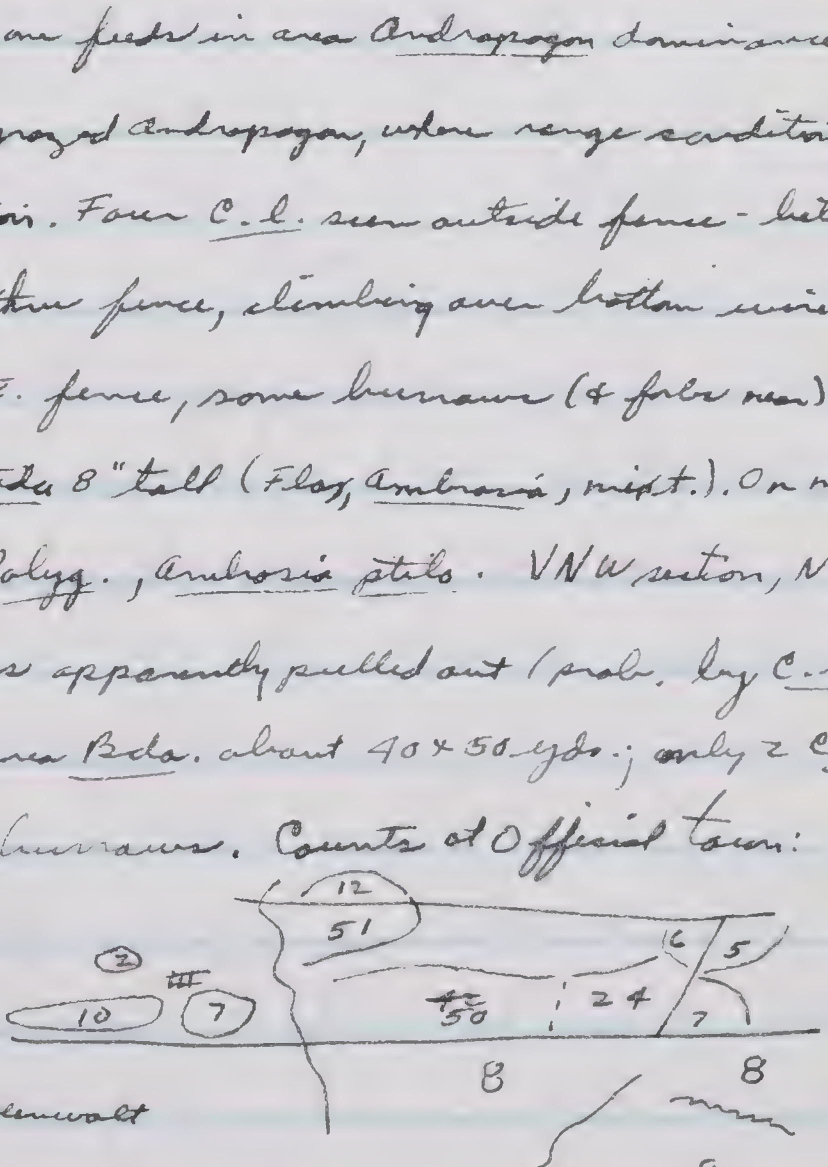
~~Sept. 1,~~ August 31, 1955 Nr. Cache, Okla.

silt loam of tan color. Some craters to ~~1¼~~ 16" tall, 6' across. Near a wet bottom Euph. marg. 2'-3' tall & not cut, no isolated stems. Under mesquite some sticks incorporated into burrows – ½" diam & 1' long common (probably fallen sticks scraped onto md.). Saw one Lepus calif. Some rounded mds. 8' across & 16" high around base of 3-4 small trunks together, each 3-4" diam. Many mounds had 6' radius area around, washed, bare of vegetation.

September 1, 1955 Took black & white photos Official colony, Osborn-Allan study area at Grace Mtn. flat. Counted dogs at official colony 8 a.m. of clear fine day. With former data, got count of 206. Estimate 225 ± 10. At official colony, rare one feeds in area Andropogon dominance. Some burrows in areas short grazed Andropogon, where range condition "high good," as based on composition. Four C. l. seen outside fence – betw. fence & paved road; retreated thru fence, climbing over bottom wire of hogwire. Especially just E. of E. fence, some burrows (& forbs near) surrounded by 50' or + of Aristida 8" tall (Flag, Ambrosia, mixt.). On mds. principal plants Amar. blit., Polyg., Ambrosia stalks. VNW section, N. of fence, had adjacent Bcu culms apparently pulled out (prob. by C. l.). The N. part of W. arm has irreg. area Bda. about 40 × 50 yds.; only 2 C. l. seen there; 14 used-appearing burrows. Counts at Official town:

Groups up to 5 seen at single burrows.



206 counted.

Grace Mtn. flat – C. Greenwalt believes more used since 1946 than before. Heavily overgrazed condit. 1936-38. High rainfall '44-'45 may have been detrimental to colony there or be responsible for conditions Osborn-Allan observed. // Arthur Halloran biologist here since last August. He

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September 1, 1955 Nr. Cache, Okla.

said surely no *C. l.* at Fullingham Flat last August, but present June 28 1955. He saw 3 burrows and two *C. l.* at dead mesquite 200 yds. ESE of Cheshire Windmill on July 21, 1955 (where I found 3 unused burrows). Possibly one was same as seen by him on Antelope Flat, ½ mile N. of paved road, on June 3. He knew little of Official town *C. l.* He says Everett Mercer, F&WL Service, Phoenix, Ariz., is well up on Arizona *Cynomys* & has visited every colony in state. Victor Cahalane has old records of *ferrets* that he did not publish, says A. H. Julian Howard (Austwell, Texas) formerly at Wichita NWLR & may have photos showing vegetation on *C. l.* towns. I noted that O. J. Murie had collected plants on this refuge 1935. / Allen-Osborn transects. End of III goes close to old stock watering trough so naturally wet there; rushes growing (*Juncus* in their account!). On Baker Mtn. flat where formerly *C. l.* town, main area now in *Asa* (40%), (grasses composition, basis 100) *Asc* (5%), *Bda* (50%), Age, Sorghast, Bcu, Aristida (total 5%). Forbs < 3%. About 75% ground cover. // E. G. indefinite about former extent Baker Mtn. town; up slope toward watertrough he thought. Photo taken of Area A shows mesquite increased much near center old dog town.

September 2, 1955 My traps took two adult ♀♀ from W. arm of Official Colony by 8:30 a.m. These ♀ 140 and 141. One in N. spot of W. arm, other 50 yds. from tip of W. arm. Both parous. These dog areas fringed with thin stand *Bga* between *Bda* zone & *Asc* zone. // I visited Osborn-Allen town & ran 300' of their line #I, as near as I could judge location. Central area bare, with *Schrankia*, *Gossypianthus* (?), + *Portulaca* common. This bordered by zone where *And. sacc.* dominant, the *Bda* present. Then, upslope, broad area of *Bda* with much *Grindelia*, ground cherry (*Sol.* or *Physalis*), dead

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September 2, 1955 Nr. Cache, Okla.

Carex (*filifolia*?). Then narrow zone where much *Bgr* instead of Bda, & *Asa* again common. Then taller grasses: *Sporobolus asper*, *Asc*, *Sorghastrum*, *Panicum virgatum*. Table made of first 10 plants encountered on line after each 10' mark. Tufts counted as single plant. Plants (prominent) within 5' each side line noted. ½" angle iron stake 2' high put at each end line. Little *Aristida* found & no zonation believed due to *C.l.* rather than to grazing. No signs of burrows encountered except occasional sunken area in area B, & vegetation not different there (slightly more vigorous?). At 0 pt. of area A, several wallows; apparently buffalo congregating spot. Line 3 not run as W. end close to overflowing water trough, which would affect vegetation,

Nr. Canadian, (Hemphill Co.?) Texas

September 3, 1955. A town of about 10 acres on gentle slope in "tight" soil among low sandhills (sand dropseed, sand bluestem, *Artemisia filif.*). Soil fine sand with little or no apparent clay. A ~~sm~~ muddy bottomed pond in central area. Town crosses barbed wire fence to grazed pasture adjacent. (Here much more grass, especially *Bda*, *Bgr*, than on reservation; dogs poisoned on this adjacent private land & few dogs present). Town has *Amaranthus* (*graecizans*? 90%) dominant, covering all *C.l.* area with large spreading plants, & very little grass (3% or less). *Amaranthus retroflexus* 3' tall on bordering slopes is heavily cut, evidently by *C.l.*, to height of six inches. In some areas *Cenchrus pauciflorus* (sand burr) 8" tall also much cut below nodes, & lying on ground near foot slopes. Other forbs present are: *Amar. blitoides*, *Verb. bract.*, *Liat. punct.*, *Euphorbia* (low-

Cynomys ludovician~~tan~~us

September 3, 1955 Nr. Canadian, Texas.

prostrate), Froelichia, Grindelia, Solanum ~~el~~ elaeagnifolium, (?-ground cherry; Physalis?), Argemone, Sphaeralcea coccinea, Proboscidea, Cenchrus, Bda, Opuntia (humif.?), Gossyp. (?), hairy Panicum, Eriogonum, Mollugo, Munroa squarrosa, Sporob. cryptandrus, Croton, Schrankia, Hoffmanseggia, Bgr, Bout. hirsuta, Cucurbita, Ambrosia. Coyote tracks seen on road; dropping on road (no C.l. in). ~~A to fo~~ Two burrows seemed to have been dug out for z' by coyote. Another z by Taxidea (one seen here Jan. or Feb.). Possible badger droppings, fresh, found near a burrow. Family of coyotes was in this area, said Jack Inglis, & road used often as runway by them. Apiaty to present. // Alfred S. "Jack" Jackson, apparently in charge of the Gene Howe Wildlife Management Area, said no C.l. in this colony on refuge side of fence until May 1954. He & others believed "tight" soils were of fine sand, no clay. There were other colonies near Canadian in tight soils. Jackson said that in Throckmorton County, Texas, in early 30's, there were many coyotes, mostly in C.l. towns. He said they caught C.l. by waiting, then running to intercept the rodent as it ran toward burrow. He also said that country said to be prairie once, but invaded by mesquite. ~~Wt~~ One area where mesquite thick, it contained a clear area with dog town. Old timers there, Jackson said, attributed mesquite to lack of prairie dogs & lack of fire. He also said there was once a fine pasture of Bout. curtip. on a ranch just west of Matador on area where thinly populated C.l. town. // A friend of Jackson's was worried about the prairie dogs on his ranch & was going to shoot ~~them~~. He

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September 3, 1955 Canadian, Texas

said there seemed to be no more C. l. than before, but ~~that~~ they were spread over a larger area. // Mesquite favors C. l.? Possibly seedlings + /or seeds are winter food. Cattle use shade, rub on trees, make wallows near, + water stands in wallows. Thus cattle use increases short grass, bare ground, weeds, + perhaps amount of succulent food for C. l.

Nr. Wellington Colorado

September 4, 1955 Gurney Crawford, game warden, phoned me ~~that~~ "Charlie," his pet at game reserve at Wellington, had disappeared, + it seemed ~~that~~ many fewer dogs in area where they had been fed. Spread out? Shot? He said he had trapped an occasional weasel in vicinity; thought possibly one got Charlie.

September 7, 1955 Arrived Wellington preserve colony 8:45 a.m. 1/10 overcast, calm, warm. In the N. census area I counted 17. "Charlie" not present, + most appeared to be juvs. Five on one mound. One Citellus 13-lineatus. Kochia drying somewhat so aspect yellow ~~green~~ -green. No recent sign north of brushline at N. edge census area. No diminution noted in area near exclosure, 100 yds. S. of census area. In census area one mound much dug up as if badger may have dug it (tho no Taxidea known here). No carnivore droppings found in preserve (one coyote? in Horse Pasture). Marsh hawk present over lower ground near colony. In + to S. of Horse Pasture I counted 26. There were 15 in western 1/3 of area, 6 at one burrow. Generally C. l. where much bare ground showed among weeds (Kochia, Salsola 1-2' tall). Much fresh cut Kochia, some stalk cut. No spread to E. evident ~~at~~, but on N. side extreme E. burrows used. Much Sporobolus airoides mixed with Distichlis, + headed out. Two or 3 Speotyto seen; less evident than earlier this year. Two flew from burrow in ploughed ground, where dog? had apparently ~~dug~~ dug

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/ see p176

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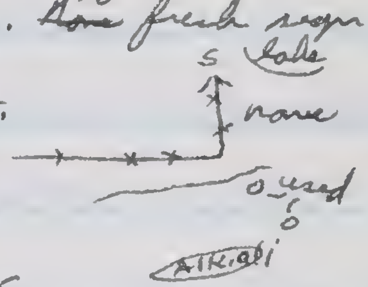
September 7, 1955 Nr. Wellington, Colo.

out mouth burrow (+ 2 adjacent). Casts of owls were insect - beetles & grasshopper mostly. (One set old coyote ? scats). Kochia main plant ~~growing~~ growing on mounds. Many burrows in SW area not used. ~~Some~~ no fresh sign SW of fence corner, but some 30 yds. to W. of it where Kochia + Iva axillaris mixed, only Kochia (taller) cut, tho Iva 6-8". // In ploughed field to S. of S.



fence, several burrows used and mounds repaired over a distance of 200 yds. Some use burrows 30 and 50 yds. out onto ploughed ground (up gentle slope), tho rare small Salsola only greenery, & old dead Salsola main plant (ploughed up). Near some burrows are several shallow holes apparently dug in search for food. ~~Old burrows~~ Two burrows 60 + 80 yds. out in ploughed ground possibly used, but dug out (by dog ?) at mouth. Here + in horse pasture I saw none at close range - not tame so probably not from in reserve area. No fresh cutting Distichlis found; this grass starting to cure. Old burrows in it have Kochia vigorous surrounding mds. // In preserve some mounds large. One 12' diam., 1½' ~~thick~~, with hole top center. Silty loam with some gravel. // Area where much small Kochia + 13 seen one morning in spring, when Kochia dug, now has few or no C. l. Where annual weeds used for food, location dogs changes much with season! Perhaps not on perennial grassland. Chrysothamnus + Atriplex cuttings old + dry; none found fresh. Chryso. in bloom. // Exclosure veg. probably will grow no larger. Salsola inside to 2' tall; none over 1' for distance of 20' around exclosure. Chenopodium (?) 1' tall inside, to 6" outside (in flower). Cryptantha 6" tall inside, + about same outside (tho rare there). Kochia 18" max. inside; 8" outside. // At

Cynomys ludovicianus

September 7, 1955 Nr. Wellington, Colo.

many spots the hedged Chrysothamnus & Atriplex bushes have soil undercut around them by C. l. (seek shade?); this adds to destruction shrubs.

Denver, Colo.

September 12, 1955 Visited Pred. & Rodent Control Div., F+WL Service headquarters, 2202 W. 32nd. Ave., Highland Pa station, & talked with District Agent Roy Fugate and Asst. Dist. Agent Leland Bowers. Most control of rodents finished August. Many skunks and badgers in state now. Formerly many C. l. in Kit Carson county. Now most work is "cleanup," there being no large number any county, white-tailed lands dogs being greatest problem. No diminution effectiveness 1080 on black-tailed prairie dogs found. // 1080 (made at Pocatello, Monsanto Chemical Co.) is going out of manufacture. Stockpile on hand, however, & other companies may supply it. Fugate said company will sell only to gov't agency because of danger. (Don Spencer says that 1080 poisoned grain being distributed from planes in California, & that very high concentrations being used (2 oz./100 lbs. grain max. here).) Control of prairie dogs by ~~tal~~ thallium to 1946, then 1080 mostly; some thallium still used. WPA & CCC camps did much rodent control work in Colorado, probably using strychnine poisoned grain mostly (to about 1940). With strychnine about 50% of kill on top of ground; 1080, 10% on top; thallium slower, most die below ground (6-8 hours to kill says Spencer). // Spencer said 1080 poisoned dog shows no peculiar actions after eating poison but heart reaction is great at early stage. I secured literature on 1080 at Wildlife Research Lab. //

Cynomys ludovicianus

September 12, 1955

Fugate & Bacus say badgers rarely killed by 1080 poisoned meat, but sometimes tunnel under the bait (Barnes, S. Dak., says likewise). // I copied parts of typed History of Predator and Rodent Control, Colorado District, compiled by Fugate. 1910-1916, field parties of Biol. Survey did some prairie dog control, especially on National Forests. 1920 (fiscal yr.) survey showed 13 million acres rodent infestation, 10 million being prairie dogs. 1921, 10,540 lbs. rodent bait distributed. Ct. Letters reported that in Douglas Co., 1921, they were "nearing the goal in the work of exterminating the prairie dogs..." [Control still going on there] (Stanley Young in charge predator control here 1921-27+). Organized rodent control ~~started~~ Nov. 1, 1919. Joseph Keyes supervised in Colo.-Kansas district then (1924, left). 1925, 157,965 qts. bait used, 643,809 acres treated, in 53 counties. 1928, 121,241 qts. bait used on 593,100 A., for rodents. Thallium used on small scale. Ca CN used for cleanup work (1780 lbs. used), & Carbon bisulfide (100 lbs.). (Ben Crandall started as hunter; now is agent at Montrose). 1929, 101,735 lbs. bait put on 498,510 acres (11,480 for ground squirrels; most rest for prairie dogs). These figures include all 4 forms of prairie dogs. ~~Counties, & wool growers associations, & state contributed~~ 1930, more thallium used. 6,237 lbs., & 44,444 lbs. strychnine oats. 1931 (Dorr Green leader, pred. & rod. control). 220,073 lbs. bait distributed on 737,627 A. 1934, E.C.W. and IMPNIRA funds supported rodent control. 1936, still control by ECW camps of USFS, Indian S., Reclamation Service, Soil Cons. Service; 170,402 lbs. bait on 568,144 A. 1937, more thallium used.

Koford

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5

Cynomys ludovicianus

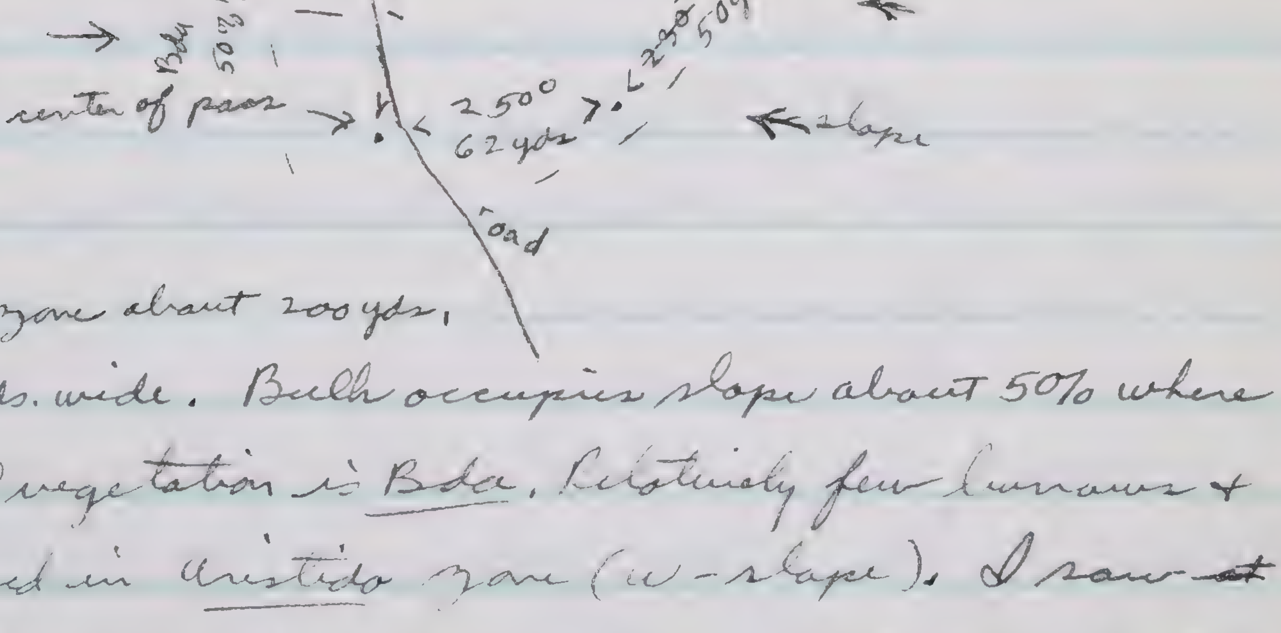
September 12, 1955 Denver, Colo.

1938, largest organized county-wide rodent control programs to date. CCC crews used. WPA project for ~~so~~ prairie dog control in Weld Co. +a 1,191,385A. treated for field rodents. 1939, 1,556,011 acres treated. Coyote-getter tried. Gas cartridges & cyanide flakes used as cleanup. 1941, CCC program discontinued June; this handicapped rodent control. 1942, plague found in prairie dogs in Colorado. 1,121,286 acres treated for prairie dogs. (Maynard W. Cummings in charge). 1944, plague in Larimer & Huerfano counties [in ~~C. l.?~~ Cynomys?]. Thallium treated bait stations used for predator control. Supervised prairie dog poisoning 380,715 acres, non-supervised 226,119 acres, in Colo. (Ground squirrels about 1/4 these acreages in addition). 1945, supervised 227,364 A. of prairie dogs; non-supervised 208,731 acres. 1946, 1080 used two counties under direction F&WL Research Lab. Sup. p.d. control, 648,882 A.; non-sup., 237,504 A. 1947, 1080 mostly. 1,210,234 acres treated (all-time high) - sup. p.d. 1,114,158A; non-sup. 164,210 A. 1948, more 1080 bait stations most counties. 1948 mostly 1080 by supervised crews. 1948, unsatisfactory cleanup of gunnison, yuni, & white-tailed prairie-dogs. (One idea to mix grass seed with poison bait; reseed as poison). 1949, supervised p.d. control 671,664 A.; unsup. 40,418A. 1950, rodent control in 50 of 63 counties. Good results only on C. lud. 1952, acreages lessened; supervised p.d. 189,742 A.; unsup. 12,777A. 1952-3, more gas used, especially SW Colo. where poisoned grain acceptance poor. ||Don Spencer says when poisoned bait not accepted, change of bait (carrier) more important than change of poison.

Cynomys ludovicianus

September 13, 1955 N. Ft. Collins, Colo.

Visited Spring Canyon Dam colony 2:15 p.m. Saw at least 10 C. l. out. Warm, 9/10 overcast; about to storm. Buffalo grass & asm mostly brown now, so general aspect greenish-brown. Salsola, Sphaeralcea, Chenopodium alb., an aster, Liatris punctata, Gutierrezia, Psoralea, applopappus, Erigeron (?), Eriogonum, short Asclepias pumila, are green. In bloom: Aster (ericoides?), Gutierrezia, Chrysothamnus, Liatris, applopappus, Eriogonum (white flower). On mds. principal plants Salsola, Sphaeralcea, Chenopodium, & on bare ground around mounds. Fresh dog or coyote droppings one mound (fruit, hair). Dried up carcass of juv. C. l. found on one md. Aristida rare on main colony, but much on ~~in~~ W. slope in area over pass to S., where an extension of colony now. I saw a Buteo flying low over ~~an~~ colony. At one site large root of Psoralea dug up (by C. l.?). Map of extension.


20
550
aristida 30%
Bda, Mtp 50%
60% bare
Bda 50%
170 yds
278°
90 yds
S
draw
20
265°
47 yds
farthest used
210°
230°
50 yds
250°
62 yds
center of pass
slope
road

Expansion zone about 200 yds, to S., 170 yds. wide. Bulk occupies slope about 50% where principal vegetation is Bda. Relatively few burrows & fewer used in Aristida zone (w-slope). I saw ~~at~~ three C. l. near center invasion zone. CPER Weld. Co., Colo

September 14, 1955 Area of colony here now drier appearing. Much Salsola starting to dry or flower, & Bda drying. Bgr and

Cynomys ludovicianus

September 14, 1955 CPER, Weld Co., Colo.

Asm generally green. Bottom of Bgr green, & at least 3 C.l. seen feeding there. Much cut Bgr seedstalks in & at edges colony, & conspicuously more of them outside colony area. No expansion, tho possibly some new burrows dug within limits old burrows during last month. I mapped limits old burrows & put in all recent found from vicinity 00N 20W to 30W 20S. An expansion upslope in much of this area, but most these recent peripheral burrows not currently used. No recent cutting of Salsola noted. Some growing 1 ft. high adjacent to mounds. I saw a coyote run from bottom at NW end colony at 9:30 a.m. (possibly drinking there). In bloom, Eriogonum, Verbena bracteosa, Chrysothamnus, Aster tanacet., Applopappus, Solanum rostr. in seed. No sign in area I saw near 24S. I set 5 traps to E. of N-S fence at E. end; saw 4 C.l. in area II. Much succulent Portulaca still present. One burrow apparently dug out by Taxidea in CA. I made overlay maps with notes & locations recent burrows. General appearance of dog area is short grass without Bgr seedstalks & no continuous areas Ska. Ska may be barrier to spread, as no recent burrows now used where continuous Ska (thinner earlier). // Visited area of colony on Prange ranch that was poisoned last year. No prairie dogs left, tho some burrows seem to have been used by smaller rodents. Areas on & around many old mounds have conspicuous green area, mostly of Salsola 2' tall, on & for a few feet around them. In mound areas are Ska, Chrysothamnus (8" tall), Art. frig., Sphaeralcea, Asm, Chenop. album, Polygonum, Aster, Schedonnardus, Plantago (purshii). Large Ska plant often grows in mouth old burrow. Ska vigorous around edge

Cynomys ludovicianus

September 14, 1955 CPER, Weld Co., Colo.

bare area around mounds, where more *Sbu* near. *Bgr* main grass this area & grows right to edge old burrow clearings or holes. (*Bgr* + *Salsola* vigorous around *Pogonomyrmex* clearings.) I took Kodachrome + black & white photos.

September 15, 1955 My 5 traps held 1 *Cynomys* (♀), 1 *Sylvilagus*, + 2 traps held a front foot of *Sylv*. Obviously many *Sylvil.* using burrows. *Crotalus* taken on colony yesterday had bird in stomach. Took photos snake. *Chenopodium album* in bottom much cut. One *C.l.* seemed to be eating seeds (?) from ground next to this plant. Scratched a few times with foot, then picked up food, stood, ate. // Met the range rider for this area of L.U. project. He told me there were still a few *C.l.* in S. 2 & 3, T9N, R65W. A new colony (or old?) near Art Warren place in NE part of T10N, R64W. Other men told me of going town 3 mi. W., 1½ S. of Raymer, in Sec. 9, on property of Rothroff sisters. Another 4 miles north of Carr. Crouch had told me of these earlier. ~~Rast, Dr~~ // Visited James Lawrence ranch (S. 2, T9N, R66W): He had moved in about 1949. About 40 A dog town on slope bordering streambed then. Repeated control by Crouch but a family (?) of *C.l.* left. No control last summer, & dogs present. This year 4 apparent juvs. + 2 adults minimum present same area. Occupied area about dozen burrows near center former town, near break in slope, 100 yds. E. of streambed, where still large patches *Bda* & some *Bgr*. Most of area *Salsola*, much of it cut by *C.l.*, & much low prostrate *Portulaca* (juicy, red), now shedding many tiny black seeds. Many ant mds, much *Munroa squarrosa*. Some *Chenop. alb.*, *Atriplex*. Rather fine sandy soil that blows + washes much.

Cynomys ludovicianus

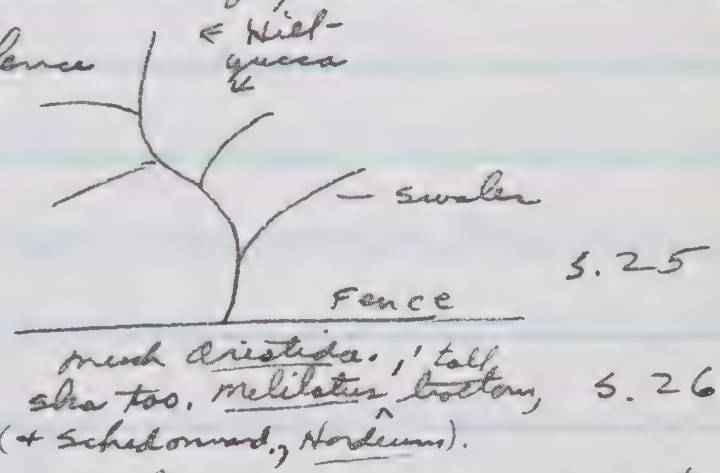
September 15, 1955 NW Weld Co., Colo.

Jim says C. l. had eaten down to bare ground (winter). area of used burrows ~~bout~~ about 70 yds. diameter. // Visited then V. W. McIntosh (S. 14, T 9N, R 64W). His father, old settler M. L. Mc., lives across road (a 1/4 section town just W. of his house poisoned last year). V. Mc. said a few burrows dug near center Sec. 14. Poisoned by Crouch but some survived, gassed this summer. I visited the site. Silt-loam soil, 2 % N. slope, blue grama pasture (50 % est. cover). A milo field adjacent to N. now. In a 50' diam. area where sod gone & weedy ground a few " below sod level, were 4 well developed craters. Weeds: Sko, Sphaeralcea, Cheno. alb., Verb. bract., Xanthium (burrs green), Amar. blit., Dys. papp., Salvia, aster ten. 2 other burrows 60-80 yds. upslope, two more (C. l.?) 100 yds. from main group (in lowest area pasture), & 1 hole 20 yds. from main group. At least two Speotyto present (also at Lawrence). Diggings suggested many Cit. B-lineatus here too, using old burrows & nearby bare spots. This spot evidently an invasion of typical spot (but Bgr, not Bda pasture; due light soil?) from at least 3/4 mile distance. // Another town 1/4 mile S. of windmill, & in NW corner S. 25 (T 9N, R 64W). This apparently old, now coming back. Located along bottom & swales of thick Bgr-Bda on slopes up to nearly 15 % grade. Moderate population now. Soil silt loam, barely enough clay to pack hard when dry at rim mounds, & generally loose. Cattle grazing here now. Bottom green, lawnlike, with isolated tall Argemone & Cirsium plants. Bottom max. 50 yds. wide. Nearly all burrows within 50 yds. of edge bottom or bottoms of swales. Mod. Opuntia here. Speotyto seen. Four groups

Cynomys ludovicianus

September 15, 1955 NW Weld Co., Colo.

coyote-sized scats contained large black beetles almost entirely, but some grasshopper parts. On mounds: *Ska*, Amar. blit., Sphaeralcea. // Little *Aristida*, this being usually upslope from area *C. l.* Much *Aristida* in next pasture to W. just across fence, & apparently no *C. l.* in that area tho old burrows there. Cover there about 40%, 90% *Aristida longiseta*, giving light tan aspect to vegetation. Is this poor for *C. l.* as compared to perennial short grasses? // Some *Asm* at edge *Bgr* bottom. T. of forbs: *Iva axillaris*, Verb. bract., Psoralea, Aag Aster ten., Plantago (purshii ?), Eriogonum (white), Lygodesmia, Chen. alb. A few burrows & mounds, now well grassed & apparently not currently used, in *Bgr* bottom. // Colony extends about 300 yds. up bottom from N-S fence. Some swales mostly *Bda*, only 5 yds. ~~to~~ wide, in bottom. Gutierrezia in bloom, conspicuous, on dry slopes. *Applop.* & *Chryso.* also in yellow flower. No browse over 10" tall. // Into 5.26 pasture, burrows go about 40 yds., but not currently used tho many used within 40 yds. to E. of this fence. Striking contrast between short grasses 5.25 & *Aristida* 5.26. In areas *Ska-Aristida*, old mounds have *Ska* principally.



← Hill-yucca ←
— swales
5.25
Fence
much *Aristida*, 1' tall, ska too. *Melilotus* bottom,
(+ Schedonnard., *Hordeum*).
5.26

September 18, 1955. Nr. Ft. Collins, Colo.

Visited Sec. 4 colony near grain fields ~~4 horse pasture~~ 1 mile S. of county dumps. In April planted barley field, in ~~one~~ area 4 well-devel. mounds in area 40×60 yards where barley had been cut by *C. l.* & *Salsola* cut low. In area 50-yds. radius around bur-

Cynomys ludovicianus

September 18, 1955 Nr. Ft. Collins, Colo.

now, Sha 95% of green veg. (few other weeds); dry barley had heads uneaten, but oat heads apparently eaten. Some oats (rare seedstalks) green leaved, ~~cut~~ low, spreading. Some shallow diggings. Sha still green, often ~~thick~~ dense stand, but no fresh cuttings found. Many green leaves oats still within 5' burrow. Poly. avic. Trace, Chenop. alb. ~~green~~ (all green), Sal. rost., green Iva, drying Convolvulus, in stubble. In a low pile of boulders, two burrows started, one 10" deep going between two boulders 3"-4" apart (boulders 10-12" diam., 1 layer thick. Several burrows new since last rain. Rosa not cut, nor fruits eaten. Cut green oats at mouth some burrows; eaten up to node. Culms of oats rare (pulled by C.l.?). Polyg. avic. may have had leaves eaten, as some missing (plant in flower). In old stubble area many Mds. have new construction, so still much activity. One strip of Sha (+ dry barley + green oats) 100' wide separates openings around two groups of burrows (veg. 1½-2+ tall). // In area of milo planting to W., some fresh cut near base. Apparently grain not eaten from fallen stalks. seeds of Some erect stalks brown now. Much Amar. blit. grows same area. // In unploughed zone, much Sha 1' tall had been cut (now dry) at C.l. side of dense stand Sha. Half of green shoots, including flower heads, of one Chrysothamnus bush had been cut, so most bush < 1' tall (recent cutting). // At N. side milo field too, many green stalks cut at height 3"-8". Some Euph. marginata also cut this site. About same no. burrows used in milo area here as before. Possibly some shooting C.l. here lately; car tracks, targets. // Visited Sec. 3 horse pasture. On some mounds:

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September 19, 1955 Nr. Ft. Collins, Colo.

Iva, Sha. Chenop. alb., on some. Asm on some abandoned (only green). In genl Asm leaves dry, + Bgr seedstalks. One aband. burr. had thick Sha, + Sphaeralcea, Polyg. avic. Bda half brown. Applopappus, Chrysothamnus, Gutierrezia, Liatris in bloom. // Along irrigation ditch bank (mud + water bottom) much Sha, tall Xanthium, green Asm, Euphorb. marg. But little evidence food-seeking by C. l. there now. Burrows in ditch bank rare, but one between two tall Euph. marg. 1½' tall + 1½' apart, + much cut Dys. pap. next to it. // No evidence recent cutting Sha; low palatability because starting to dry? Many areas of Bda scratched up, apparently by C. l., with much loose cut grass blades on (these can be scraped off with fingers, showing stubs of bases beneath, + rare stolons). This so common that Bda evidently the sought food now (many droppings, 3-8/sq. ft., here); Bgr rare here. This on slope where most C. l. // Burrows on upslope side ditch only at W. end, toward road, where slope less than 10%. Much Bgr - Bda on this upper slope. // Where Helianthus near burrows, not cut. In local areas much Iva axill. or purple Solanum; in low damp spots Aster ericoides (?) + Bahia oppositifolia. // Some burrows apparently dug out when wet inside, for mounds covered with hard dried mudballs ½" to 2" diam. // Much Asm leafage dried up uneaten near C. l. burrows. // Two burrows about 1' diam. used, as shown by new constr. on mds. Some burr. had old Xanthium burs on mounds, end or side cut off — probably eat in winter, tho now 40 yds. from X. plants. Chrysothamnus about 6" tall on W. ¼ town; cut by C. l. evidently; but

Cynomys ludovicianus

September 19, 1955 Nr. Ft. Collins, Colo.

2' tall at periphery, & thick beyond (why no C. l. there?). Many old bones on mounds; some of jaws. // One carnivore dropping 1/2" diam. had hair of C. l. prominent. Coon tracks along irrig. ditch. ~~Lower~~ ~~Gentlest~~ lower slopes have much Sha, little or no C. l. activity, tho much in spring. // Burrow mound repair scratchings to 8' distant; old Sha scratched up, & nearby Chrysothamnus undermined by this activity. Much dead veg. incidentally scratched onto mound. // No Speotyto seen in Sec. 3 or Sec. 4. No expansion area of colony noted. // At Spring Canyon Dam colony, 4-4:30 p.m., counted 4 N. of fence (2 near #9, 2 near #22), & 11 to S. of fence (including 2 near #20, 2 near #25), & 2 over crest to S in expansion area. 17 seen; doubtless more present. Now dry brown color Bda contrasts with surrounding Sha, & it is obvious that burrows are in Bda areas. About 1/4 of Bda blades are green; mostly 1" tall. Bgr common higher on slopes than Bda. Asm dry, & Bgr seedstalks (seed rare). No digging for food or new burrows noted. Light rain 4 p.m.; two repairing one mound 4:30. // In dry pond bed, Sha thick but no recent cutting apparent. Burrows #7 & #36 show no current use. Mds. have Sha, Chenop. alb., Sphaeralcea on. #8 & area to S. of it not currently used, & #2 & #21 area not currently used; nor #27, 29, 30. No use higher old burrows on slope on E. side colony. At pass at N. S. end, currently used well-developed mounds, however.

September 29, 1955 Rain morning; clearing & windy afternoon. At 4:30 p.m. made count at Spring Canyon Dam colony. I counted 19 to S. of fence, 6 to N. Of these 6, two in bottom near #9; two near bottom E. of #23, but feeding

Cynomys ludovicianus

September 20, 1955. Nr. Ft. Collins, Colo.

near #11; two near #19. The 19 rather evenly distributed over former area, not more than 2 together. None seen to S. of pass (cattle frightened them?). At 4:30 p.m. W. 1/4 colony in shadow of mountains. Estimate min. 28 present on colony. No evidence shooting here.

Nr. Cheyenne, in Colo.

September 21, 1955 Stopped at Terrey Ranch of Warren Live Stock Co. in Colo. near state line S. of Cheyenne. This is headquarters ranch of sev'l Colo. ranches of W. L. S. Co. Talked with Murphy, manager there. He said F + WL control man had been out twice to supervise prairie dog control work, but still some left. In gen'l C. l. few, due control. Some new colonies had started, + efforts made to kill early. Murphy said some new in poor pasture, some at edge of sheep corrals. He agreed that new generally in swales or bottoms where grazing heavy. He said some new colonies had started at least 3 mi. from old known ones. Offered to show me dog towns in mid-October when cattle shipping less pressing. Mostly Bgr grass here, said Murphy, + C. l. eat it down to ground. // Scotts Bluff Nat'l Monument, nr. Gering, Nebraska, visited. Supt. Anderson absent at conf., but said to be very interested in C. l. (old Yellowstone man). Secretary there gave me info from files. She said area a monument since about 1919, but not developed until 1935. No grazing since 1935, + probably not since 1919. // A memo from V. H. Cahalane had requested yearly map of C. l. towns. Maps made in 1941 + 1942 (about 100 acres in town). I copied these maps on topog. map. In 1940 most lay on a flat (very gentle slope) near gully about 1 mile

Cynomys ludovicianus

September 21, 1955 Scotts Bluff, Nebraska.

east of headquarters. 1941, crossed one gully & ~~started~~ in flat closer to headquarters, & enlarged boundarys somewhat upslope to N. This trend continued next yr.; the new area of flat near headquarters showed less activity ~~on~~ in N. 1/4. // Gen'l reports of wildlife said some decrease in population in 1942 over 1941, except near boundaries (food low center?). Maps & reports were by Merrill J. Mattes, Custodian. 1941, cottontails noted on *C. l.* town. Coyotes often seen in monument. 1944 report said population appeared to be stable. 1945, stable but low. 1946, decreased; thought due poisoning by ranchers. 1947, only 3 or 4 seen; believed poisoned. Badgers rare; coyote occasionally seen. 1948, no comeback [probably gone]. // Monument personnel would like to ~~so~~ start a colony well inside monument, near headquarters. They had heard of large colony near Lyman, Neb. (17± mi. W. of monument). // On lower ground just outside old town, *Androp. scop.* common, *Bout. curt.*, *Eragrostis*? 1½' tall, some *Bgr*. On flat where old burrows, main part town, *Carex* (*filif.*?) estimated 80%, *Stipa comata* 15%; Bgr, Asm 5%; Trace weeds - Sphaeralcea, Gutierrezia sarothrae, Liatris, Aster, & others. Soil of fine texture & loose when kicked - a light clay of buff color (like bluffs) with little rock. // Many old burrows still open, 8 or + yrs. after use by *C. l.*, with spider webs mouths. Most holes 10±" diam., probably eroded. Mounds from none at all to 6" thick. Barish area around most burrows, & weeds conspicuous at site. On some bare areas around mds. are clumps *Aristida* (*fendleri*? - awns too short for *longiseta*), clumps *Bgr* (bunch habit), *Asm* or *Stipa com.* in single bunches, rare *Oryzopsis* bunch. *No* *Bda* seen.

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September 21, 1955 Scotts Bluff, Nebraska

Weeds on old mds. & bare grd. adjacent; Sphaeralcea common, & Sla. Others: Applopappus, Liatris (blooming), Psoralea, Lygodesmia (not prostrata), Euph. (geyeri ?), Phlox (hoodi ?), (no amaranthus), Cryptantha, Schedonn; Chenop. alb., Gut. sar., Sol. triflorum, another area of main colony on flat had est. 50% Carex, 45% Stipa com., 5% others. Md. areas about 80% bare in genl. Photoed some in Kodachrome 35 mm. // Bare areas of mounds often surrounded by vigorous Bout. grac. - many & tall seedstalks - tho other grasses dominant a few feet away. // On a lower bench near gully bottom also old mds, but Asm dominant (60%), Carex 20%, Bgr 10%, weeds & forbs (Sla, Art. frig. prominent) 5%. Stipa rare. // All areas have 1/3 to 1/2 bare ground between tufts; less bare where short grasses turflike. // In NW arm many Art. frig. bushes 1½-2' tall in burrow area. C. l. probably kept these down. Occas. Atriplex canesc. bush. Ant mounds rare & low. Many gopher mounds in some parts old townsite. No common droppings found, no tracks, but rabbit droppings present. NW area has Stipa dominant, & Art. frig. Area old mounds stops at upslope side about where Afr - Stipa zone stops. Upslope is area 2' tall Eragrostis ? 70%, Carex 20%, Bout curt. 5%, And. scop. 5%. # Slope steepens many yds. beyond where these midgrasses become dominant. // NE arm of colony also ascends slope. Area of C. l. about 80% Stipa, + Bgr, Bcu, Asm. Common Atriplex & Artemisia bushes. Just beyond dog area, where slope steepens but also alongside dog area on E, Androp. scop. dominant, 2' tall, with somewhat less Eragrostis ?. These 2 species seem to indicate area where C. l. did not penetrate (where moister on slopes ?), but what there 10 yrs. ago ? Asc now red-brown,

Cynomys ludovicianus

September 21, 1955 Scotts Bluff, Nebraska.

headed out, & conspicuous at a distance. // Bunchgrass habit Bgr, single-stalk habit Asm, & lack prostrateness in forbs or old weeds is here very apparent (no prostrate amaranthus). // 1941 invasion area near headquarters required crossing of gully 50 yds. wide, 15' deep, but now vegetated most of distance. In this area much Sha near old burrows, & Aristida. Gen'l area characterized by Stipa & Asm, tho Bgr is 50% compos. some sites. Burrow sites conspic. with Sha, white Melilotus, Art. frig., Gutierrezia, Lygodesmia. Many Thomomys mounds. // It is probable ~~so~~ that stands Asm or Stipa comata as seen here could prevent establishment of migrating C. l. I ~~believe that~~ think a stem density that makes it impossible for C. l. to walk without striking stems will prevent such establishment (but can walk into if favorable condition adjacent). Stems must be sev'l" high, of course, as C. l. walks over closegrazed dense cover.

September 22, 1955 Wind Cave Nat'l Park, S. Dak.

Rain. Grass dry appearing now. Red-brown Androp. scop. stands out strongly on slopes & hillocks, but flatter areas mostly Bromus in dense stand 1' tall. // Ester Suter says he marked limits some towns with stakes years ago. Dogs that went out & dug new holes always old ones, & that later they came back in & abandoned outermost burrows. // Visited Bison Flat colony in mid-afternoon. In area to W. of road I counted 13. Two of these separate from rest (along foot of hills), 150 yds. N. of hills & 50 yds. W. of road. These two at a mound atop a large old mound 2' thick & 40' across. Big md. covered mostly with Bda, but also Bgr, Asm, Aristida, & 5% weeds. Alongside

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large mound a fresh hole, 20' from top lge. md.; dry Asm cut around it - 90% cut to 2' distance. Much Asm cut (below node) at other sites - could pick up handful of cut stems - but one area of few sq. ft. on md. not cut (5' from hole; 1½' tall seedstalks). // In area many Asm heads, & half leaves Asm green. Bda has few green leaves. In bloom are Solidago, Chrysopsis, Aster commutatus, Grindelia. // No extension W. since my last visit sev'l wks. ago - farthest about 150 yds. W. road, near foot of hills (on S.). Upslope area from C.l. this zone is solid dry Bja. A swale where C.l. are on slope has no Bja apparent. Bja probably barrier; ~~indicator unfavorable~~ but in gen'l grows on lower slopes that would appear suitable, from standpoint slope & soil, for C.l. / On extreme W. md. a coyote dropping, fresh; most hair in is not C.l. But 5 yds. E. this burrow a fresh C.l. body, skin turned inside out over bones, but bones appendages ~~[illegible]~~ not broken; Old ♀. Grass in mouth so probably quick death. Saved jaw, femur (♀ 147). 3' from it was intestine & caecum, not stomach, spread almost intact on ground. Upon my arrival I had flushed a marsh hawk from the site - had it or coyote made kill? White hawk excrement at site. Meat fresh; probably kill today or yesterday. // In this W. arm burrows gen'lly in patches Bda, with about 4. 30-50% Asm at distance 10'-15'. Nearer road, where presumably longer occupied, much less Asm & more Bda ~~area~~ in area burrows. // Visited N. part colony to E. of road. Here again much Bja just outside area of C.l. Characteristically peripheral burr. surrounded by sht. grasses & weeds; then Asm, rarely with seedstalks, is prominent for a short distance; then 12" tall Asm leaves, & seedstalks present; then mixture Bja-Asm, Bja dominant. Some old burrows at sites 50 to 75 yds. N. into Bja area from peripheral occupied burrows. Sites evident from distance by lack Bja there & shortness of vegetation (shorter than Bja). Areas of 8" tall Asm (blades) occur in Bja - nearly pure Asm. Some have burrows in but not current-

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ly used except when close to Bda area (some have (undulating) paths 3-4" wide thru this grass between burrows. // To NE a group of about 5 burr. at extreme periphery in abandoned, but a group 50 yds. short of them being used now. C.l. characteristically in areas Bda, surrounded by Asm, then Bja. There are scattered sites like this not yet occupied by C.l. // In a circular area of about 1 A (at head of draw leading SE) about 250 yds. ENE of dam, I saw counted 15 C.l. alarmed, as many as 5 ran to same mds. & stood. Feeding seemed to be mainly at upslope edge of area. Some small still. area had Bda cover about 90%; Bgr + Asm 5%; forbs 5% (green Asclep. pumila with head; Solidago green; dry Hedeoma & Plantago purshii. On mds: Asclep. pum., Solidago, Verbena bract., Poly. avic. // In area oldest part colony near dam, from 5-15 / A. No general decrease there (save possibly low spots). Two fed in green bottom above dam. // A Sylvilagus seen 3' from a C.l., both quiet, on one mound. // Near road W. of dam I saw diggings to 4" deep among Asm roots. One site bared half-eaten potato-like root about 3/4" diam. (raw-potato smell) (not Psoral. ten. or Sphaeralcea).

September 23, 1955 Wind Cave N.P., S. Dakota.

Cold night. Sunrise about 6 a.m. No C.l. out by 6:30 in Wards A, B, C. of Shirttail Canyon. Ward B - large areas dry Dys. pap., Hed. hisp., Chenop. lepto., ~~Ao~~ Plantago purshii. Aristida belt at N + S. edges of area. At 8 a.m. I saw 2 out in E. 1/4 of ward, at edge Dpa zone. // Counted 13 on Ward A 8:10 a.m. 4 at one mound, apparently juvs., + 2 apparent juvs. another md. Evidently an influx of juvs. since July. N. of old Ward A ~~shd~~ striking break from short grass to tall Bja at N. edge. Dyssodia papp., red brown + conspicuous, 6"-8" tall, dominant over ~~much~~ most of old Ward A but little on extended areas to W + N SW, but old area flatter so may be soil or

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moisture difference. // Area X ~~W~~ (SW of King's area 5) had 3 C. l. out. On barer parts much Dpa, widespread. Green Asm in belt inside dry Bja not cut. (Bja has lost seeds long since). Isolated burrows 100±' S of Area ~~Y~~ X show no recent use; one at E edge of Y, 10 yds. into Bja, used. // Area W shows no use. 1½' Asm & Bja grow in it, & tall Afr; much Sphaeralcea, Dpa, & Am. blitoides too. Not reocc. this year. // Area Y shows no current use; abandoned? // Area Z, bottom S. extension of ward C'; may have few or no dogs - no sure C. l. diggings & none seen. Same at S. tip of C', ~~only~~ to N. of streambed. Sure construction only to 50' S. of road across bottom. // Much Sphaeralcea coccinea in most C. l. areas here. Many leaves lost, & some partly eaten, perhaps by C. l. Occasional Cleome serrulata near C. l. burrows, & not cut down. // In Ward F I saw 9 out. Fewest where Dpa thickest. 5 in east ¼ area. Scattered Asm in & around area, but no fresh cutting of it seen (green, but tough?). Checked slope - 20% is max. having burrows (SSW slope). // At SW part Ward C, much repair work on mds. On bench at extreme ~~S~~ W. end Ward C, new constr. at peripheral burrow 30' from tree at creek edge, but burrow where family seen in July was closed & mound flattened (rolled on?), & no activity sign close to it. // Isolated holes near streambed in SE of Ward D were abandoned. These were at openings in Bja area, & one or + seen there last visit. // Ward G, I saw 11, including several juvs. None seen in E. 50 yds, E. of Cole pipe stake, & no recent sign apparent there. Area in gen'l is in brown Dpg, & short Verbena bracteosa. Belt of Aristida at both N + S (upslope + downslope) sides. No grass in central part of area. // N. ⅓ of Ward D, higher on slope, mainly in Verbena bract., mostly dead. Upslope Aristida - Dpg belt where

Eragrostis ? at Scotts B. = prairie Sandreed gr.

woody aster = A. commutatus (most - ½" diam. white flower

A. ericoides

Salvia sp. = S. sel lanceolata.

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slope steepens. Sheet erosion apparent in weedy area; silt loam soil. On S., lower & flatter half Ward D, Dpa dominant & conspicuous red-brown. // Ward E. has low population, but occupied to near upslope limit, 15% slope. Aristida, Dpa, & Msq = 90% of vegetation. Dpa dominant; Aristida in patches (soil diff. probably). At NW edge, order of plants from in colony area to grass outside is: Forbs weeds; Shedonnardus-Aristida in open stand (weeds too); Bgr-Asm (+weeds); Bja (+other grasses). Weeds major cover until Bja wall starts, 1½' tall. Much Sphaeralcea ~~about~~ throughout area Ward E. Bda rare here (too steep?). Area extends 100 yds. up slope, bearing 310°, from Cole pipe stake, to edge pines. // SW part of E. has about 70 yd. long area old burrows where Asm dominant, suggesting C.l. kept out surrounding (on downslope side) Bja (upslope steeper; Asc present). Patches Bda in this Asm area. // S half of D (N. of dirt road) mostly Dpa, dry. ~~Cle~~ Chenop. lepto. (=Cle) common, not recently cut, & green where not dense. Patches Bda several yards across show little evidence C.l. ~~dam~~ eating (2" tall). Bda mixed with Aristida at some sites (going which way in succession?). In two spots many yds. across where Cle thick, it is 5" tall & dead. In parts SE¼ of D, Msq dominant, 90% of ~~density~~ composition where density plants 50%. // Generally there has been abandonment of peripheral burrows, or possibly groups with several dogs. Large no on Ward A suggests these went into areas low population, not out.

September 24, 1955 Rapid City, S.Dak.

Visited Les Albee, Soil Cons. Service. He identified plants for me & reported info. about albino prairie dogs at east side Cave Hills near Ludlow. ~~He~~ Regarding Aristida-Bda mixtures he said

Koford

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that usually when range going down Aristida prominent when Bda increasing + Bgr decreasing (but also when recovering from heavy utilization). In gen'l he thought ranges in Wind Cave N.P. only fair to good. Best on slopes where little buffalo grazing + much Asc, but usually Asc would not cover flats + bottom areas (due low rainfall). (About 10 mi. S. Sturgis I saw good stands Asc on very gentle slopes suitable for C.l.). // I asked Les about growing season in years of King study. He said 1946-8 green in Black Hills most of summer compared with hotter, drier years 1949 + 1950. So summer drought + food shortage possible to 1949 + 50. 1951 was green from spring on. Fall shortage food ~~produce~~ favors expansion colony in spring? Growing season hard to judge from temperature-precipitation records. 1949 was very dry summer (at Cottonwood, for example). // see p277* 3 mi. S. 1½ mi. E. of Ludlow, S. Dak., visited Ralph Jacobi ranch. R. J. long there + interested in wildlife. Once prairie dogs from ranch to "the river," in area about a mile wide, R. J. said. He told me of town with about 1/4 albino prairie dogs about 3 mi. airline W. of ranch. One had been shot for exam. - had pink eyes, white belly, near-white back. Albinos seemed to stay together one part town. He offered to accompany me to site (a few days hence). Town only recently known to R. J. Owner had requested poisoning, but no action yet. This area in 4th yr. of drought. Sharptailed grouse here - a 1914 publ. on Harding Co. says these nest on benches in bottoms; Cynomys characteristic of these areas too.

September 25, 1955 T R N M Park, Medora, N. Dakota

Bob Mo[illegible] told me C. l. here had not changed population notably since my visit in May. In town near headquarters + Paddock Creek, where population very low compared

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to 1954, he had noted no young & believed dogs remaining were concentrated one area. A juv. albino had appeared at SE entrance town, & probably still there. Seasonal ranger had seen 2 bobcats hunting on that town this summer. Adult had little difficulty catching *C. l.*, but young one clumsy at it. This a dry summer here. // Today cold & overcast & windy. // * Albee said: 1949 driest summer & fall since 1949 in SW S. Dak. 1950 spring slow. // Visited town in lower Paddock Creek. Saw 9 *C. l.* spread over 200 yds., only 2 per site, & workings indicating a few more present. All in area 200 yds. long & 50-75 yds. wide on about 5% slope, generally near upslope & upcanyon edge of burrowed area, but not in extreme peripheral burrows. Grasses & weeds mostly dry & dead. *Sha* prominent on some mds., but short. (Some stock grazing; droppings.). No bones found on mds. Dogs appeared large & very fat. One seen to eat green leaves of *Convolvulus* growing on mound. No apparent juvs.! Much *Bgr* some sites, & *Asm* and *Stipa* ? (not com.) lower spots. Much *Artemisia frigida* 1' tall had been cut (now dry) + left lying; ~~perhaps~~ 9/10 of it cut at some sites. Many shallow diggings on + near mounds, as if for food - perhaps roots of forbs. (Little silver sage among *Afr*, but 1-1½' tall when present). At up-canyon end of group, where holes lowest in toward bottom, 3 holes appeared to have been badger dug this summer, ~~one~~ (No rain since late July; only one appeared to be dug since rain). No carnivore scats or hawk feathers or *C. l.* remains found atop ground. ~~Apparently~~ Apparent gopher work around base some mds. + even filling mouth of burrow at some sites (some dug on

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September 25, 1955 Theo. Roosevelt N.M.P., S.Dak.

mds. may be gopher). Apparently in pairs of adults well separated from each other (check this). || Peaceful Valley town now mostly in mid-grasses (Asm 1½' tall seedstalks) & Bgr, weeds < 5%. Schedonnardus on some mds., & some sites near present C. l. C. l. in two areas 40 yds. apart. On these areas Bgr turflike, but conspicuous areas Plantago purshii standing. Area nearest road (to W.) (= area #1) had 6 C. l., at least 5 apparently juvs. These fed vigorously, often scratching with forepaws several alternate strokes, then picking up in paws or teeth & eating while sitting up. Eaten material appeared dry. At site I found many diggings ½" deep, & tap of 1/8" diam. chewed off root there (some apparently Sphaeralcea; saved roots; little Sphaeralcea present in leafed form). Occasional stunted Chenopodium (lepto.?) green, but in gen'l green food rare (critical now?). Picked up skull of juv. (appear. died this summer). No carnivore sign noted. Area #2 (to SE of #1) had 7 dogs, at least one adult appearing. Area #2 about 50 × 50 yds.; area #1 about 100' × 100'. In areas grass generally short Bgr turf. Some use mounds & burrows outside and between these ~~spots~~ areas for ~~[illegible]~~ many yards. || Viewed site of dead Lawson town. Conspicuous black dead Sbo ~~at base~~ on and close to mounds & sometimes areas between. Asm to 2' tall between burrows. Afr borders edge mound area of many abandoned burrows in grassland (so C. l. favor Afr?). Burrows comparatively close together here & on relatively steep slope. || 1953 (check) was year of especially good grass here; correlated with disappearance of C. l. in 1954? || Beef Corral town thriving. A cattle & prairie dog exclosure had been put in near Lower Potter transects in NE part town. Remnants of large ~~silver~~ silver sage, made low by cattle or

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September 25, 1955 Theo. Roosev. N.M.P., N. Dak.

by C. l., included in it. // I saw two C. l. cut or pull up 4" dry forb (aster?) and eat base or roots. Many shallow diggings on many mounds and on intervening ground. Stub of root (many Sphaeralcea size & appearance) found in several, top of root eaten. Areas of turf-like Bg dotted with scratchings, & most of grass blades there loose, cut or broken off near ground surface level. One could scrape up loose grass with fingers, leaving mostly stubs & few blades growing. Apparently food is getting short for C. l. here. Green forbs rare, ≤ 1/4 % est. 0 cros. Sphaeralcea, but low Afr & silver sage (to 6" tall) may provide some food. Upslope, to W. of road, greener & more forbs, steeper. Many C. l. ~~here~~ this colony apparently juvs. // Badger seen at 2 p.m. near SW corner colony. It retired into dug out C. l. burrow. Another dug out 10 yds. distant. About half of mound leveled on 180° of it on side of digging. Many evident badger-dug holes in other parts of Beef Corral colony, apparently dug this summer. 4 such in 50 yd. distance (line); 5 in 50 yd. diam.; 6 more found in 20 min. of search. But no bones or other remains seen. // Badger work heaviest of any colony I have seen, but colony huge & proportion of burrows dug perhaps 5 % in main area. Bobcats, eagles, coyotes also apparently hunt here some seasons. // At Paddock Creek I had set 3 steel traps this morning. Found one with prairie dog foreleg in it, pulled off of dog ~~at~~ with scapula attached. Probably taken by carnivore (bobcat? coyote?). // At sites many yds. diam. within main area wds. of Beef Corral town, Asm in high proportion, ~~+~~40" tall, uncut, & Bg. seedstalks, dry, uncut. Probably do not cut after start to dry, & these areas not cut earlier in yrs. (due too much ~~tall~~ mid grass?). // Does cutting seedstalks in summer ~~ma~~ change plant habit (to turf) and make more favorable for winter food? // At Beef Corral, at site old corral (50 yrs. ago) mostly

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Schedonn. & *Plantago purshii*; different from surrounding area where much *Bgr*. *Bgr* generally lacking in lower Paddock Creek town in area of abandoned ploughed ground, tho *Asm* common there.

September 26, 1955

Soil scientist of SCS, Dickinson, told me that in this region prairie dogs mostly on Moreau clay loam. Commonly on "scabland." But on any soil that will pack. Generally on immature soils. In park on fans & other soil washed down from bluffs. // At small town near SE entrance, population moderate. I saw 15 in W. 1/4, in area 50 x 50 yds. Less elsewhere. None seen upslope from road. At roadside slope, many shallow diggings for roots. On colony grass mainly *Bgr* turf 1" tall. Much of it cut at base. About 50% bare ground before cut. No apparent spread of town. At E. side, old weedy mound farthest E., in short grass area, but 5 yds. E. of it midgrasses (*Bgr* - *Asm*) 1' tall & thick, tho soil & slope same. No recent eating cactus leaves. (Fruits shed & seedless, but mice probably ate). *Bgr* turf areas near colony to E. & downslope to S., but no invasion. Slope 5-10%, to S. A group old mostly dead *Artemisia tridentata* shrubs at downslope edge activity; tallest 4'. Few silver sage stalks (0" tall) cut, probably by *C. l.* // In middle colony, some burrows downslope 10 yds. into *Asm* & other mid-grasses 1' tall & thick. These trampled & had trails thru, near burrows. Most of these, & some 20 yds. into mid-grasses, apparently not currently used. An occasional large *Amar.* *blit.* on mound but nearly dead; a few seeds on ground near - food for *C. l.* Some green leaves remain on *Salsola*. 3 fresh appearing badger dug burrows in W. part colony. A few old unused burrows to W. of W. edg. colony. // On upslope side of road 8± burrows within 20 yds. road in area 25

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yds. wide. Apparently no current use but used earlier this year, & badger dug probably ~~months~~ some ~~earlier~~ in this year. // Spreading Argemone (or Cirsium) has all leaves cut off at base in some C. l. towns (dig around base at Skirttail Ward A). ~~To~~ Areas where dry Dys. pap. dominant include zone of highest population here. ~~Gopher~~ (Thomomys?) mounds on same slope as C. l. (within sev'l feet burrows). // At 12 M took 2 ♀♀ from steel traps set 15 yds. apart on Paddock Creek town. Saved for exam (B ♀ 148, 149). One taken where leg in trap yesterday. Green plants, including shrubs, < 5% in areas capture. // I saw one eat dry Schedonnardus (cut, eat from base), green short Salsola, green Sphaeralcea, some dry forbs, all in 5 min. Green plants: Gutierrezia, Sphaeralcea, Art. frig; Ska, Convolvulus (also seeds on ground). // In all about 14 C. l. in colony, some separated 100 yds. from neighbors, all in about 5 acres of old colony in area former ploughed ground. Two within 100' of road. Apparently no tendency to form compact colony. Apparent activity - cutting of Afr - to 50 yds. from some presently occupied burrows. Much digging for roots some sites & on some mds. In gen'l estimated 2% of veg. is green. // On upper Lowman draw town, weeds thick & 6-10" tall some areas - Hedeoma, Ppa, Plantago p., annual Erigeron, Grindelia, Gutierrezia. Ska thick all over mounds. Occasional Afr 1½' tall. Mustard 2' tall. Grasses about 5% of cover - Schedonn. mostly, & Asm, some Bgr. Asm nearly pure in swales & lower sites. Bgr common only at up-canyon part colony. Black ½" diam. lichen (?) common on ground. I saw one C. l. at burrow (old badger bored) well up slope a few feet from Asc & Agr (so C. l. probably not there

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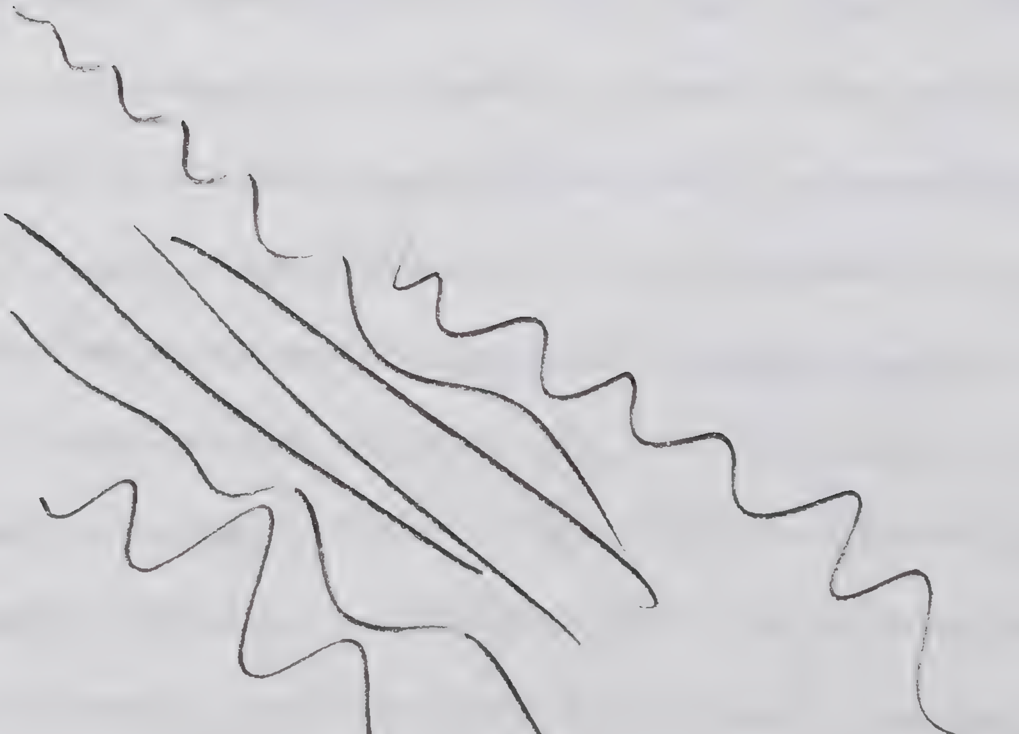
long. No new construction on burrow. I set steel traps there. Sev'l (5) old badger dug holes vicinity. (Brooks, & Spike Thomas had seen 1 or 2 C. l. this gen'l area earlier this yr. - so survivor, not invader?). No others seen here (town dead). // On 15% slope where Asm - Bgr dominant, much Art. frig. 1' tall grass in circle around abandoned mound. // Lower (W.) Lawson town mainly Asm - Bgr in bunchgrass habit (turf habit favored by C. l.?). Apparently use previously this summer of burrows to 50 yds. from present center activity. // Chester Brooks says that he has seen either a badger or bobcat at Beef Corral town several times since spring; on almost every trip there. He said seasonal ranger saw bobcat catch a C. l. on S.E. extreme town this summer. // Before sunset all dogs apparently in burrows. Shortly after sunset I saw 1 badger on Beef Corral town. Alarmed, ran by degrees 150 yds. distant. Dug a few strokes a few ft. from two C. l. mds. (for food?), at sev'l burrows put head in, then turned about & backed rear end into burrow, then a few seconds later traveled on - urinating in burrows? A small appearing badger. I also saw a porcupine among burrows at upslope edge of town. This "flat" about 5% slope to W. // Over hill to E. of Beef Corral town & N. a few hundred yds. a group of about 15 burrows with mds. (& 6± without) in area 40 X 40 yds. on gentle SE slope. I saw C. l. there in May, & now evidence of use earlier this year, but apparently no C. l. now there. Two carnivore droppings containing hair on one mound. These in wide & long slope of Asm - Bgr - & midgrasses, thick, but



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areas Bgr turf too. Few weeds; sage shrubs common. I have seen several ferrug. roughleg hawks & marsh hawks here, but personnel have seen no kills.

September 27, 1955 Clear morning. At 8 a.m. took ♂150 from trap in E. group burrows in W. Lawson town. In E. Lawson "ghost town" I saw 2 at same hole as yesterday (9:10 a.m.). In W. Lawson town, 5 (all surely juvs) of W. group ran to same mound in alarm; other one possibly adult. | At Beef Corral town, about 75 yds. in from S. edge dead Art. cana 3' tall, & at S. edge much dying, burrows dug at bases many, & mounds cover bases many dead. No new intermediate sized shrubs (over 6"). | Beyond SW edge along Asm, Bout. curt., Bgr mainly, in mod. density, sweetclover 1½' tall. | One burrow, well-devel. md., under crown of elm (12' above), 10' from 12" diam. trunk. Some burrows, not currently used, among plum bushes 3-5' tall where stems 1' apart. // On Beef Corral bottom, density 15-20/A. of C.l. at many sites, & 5 apparent juvs. on one mound not uncommon. Brooks said some people had noted decrease in adults at S. end after juvs. above ground. // Much Bgr turf remains, but over sev'l square feet are loose, grass cut at base (grass 1-2" tall). // At 9:15 a.m. I saw an imm. Aquila e. swoop low over NE part town, flex gliding in from behind a bluff. Soon thereafter 2 eagles perched atop that bluff. (In evening saw ad. + 2 juv. on bluffs to W. of town). Saw apparent prairie falcon dive at perched eagles. Saw 1 marsh hawk over edge of town. // In C.l. burrow at W. center of Beef Corral bottom I saw a badger & photographed it. It appeared to be sleepy, & possibly sick, & it allowed approach to 10' distance. Photoed badger. (Brooks says he noted little badger or bobcat activity here until August; then often saw one or the other in this

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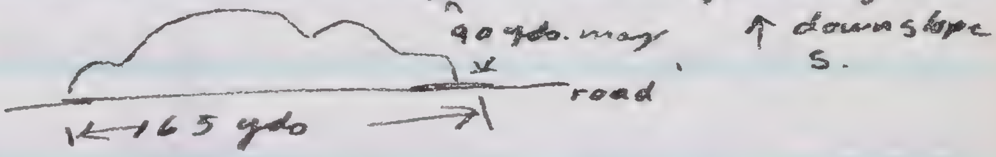
town, tho no actual kills of C. l. witnessed. //At 10:15 at Paddock Creek (lower; = Haliday) town I counted 18 out, 3 being at 2 sites; total spread 400×100 yds., gps. 2-3 generally ~~to~~ 50-100 yds. apart. Estimate 25 present. Two that I trapped there (♀♀ 148, 149) were juvs. tho large, & very fat. //At 10:30 a.m., W. group in W. Lawson were spread to W. across road to 80 yds. from area concentration. This general area had much Bgr. turf & doubtless often used (♂ 151 trapped; fat juv.). //I saw 1 chase, not catch, a butterfly. //At 11:30 a.m. at E Entrance town I made several counts. 33 counted; estimate 40 ± 5. Most in center ⅔ of colony. All in area of 2 A.



Occasional tufts of Carex, cut at ½" (by C. l.?). Dry Dys. pap. is ~~tallest~~ forb. Bgr. stolons grow to 10" tall in Opuntia clumps. Sol. trifl. green & large on one mound. Green food about 1% of total present: Opuntia, Eurotia, Art. frig., green forbs. More green forbs by edge road, & a few C. l. seen to feed there. //Beef Corral town extends E. up a canyon for ¼ mile from main town on flat. In this arm extends up sideslopes to 20% slope, & nearly to head of the draw. Density high there. Much Schedonnardus, Dys. pap., Art. frig. Estimated 5% of burrows dug out by badger this year. Many small diggings for food. In one section of 2 A, 90% cover is Art. frig. + (less) Eurotia. Bgr. turf 50% mowed at some sites. A few C. l. out until 5:35 p.m., 20 min. after sunset. Clear, calm, cool. At 5:15 trapped ♀ 152 in central part of S. end colony. //Chester Brooks says that he & wife saw bald eagle ad. & imm. at Johnson Plateau town in late July. The imm. flew from ground carrying a prairie dog in claws. Albino at E. Entrance town not seen since mid-August. Seasonal ranger at E. gate was T. P. Lenhardt of Belfield. He

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September, 27, 1955 TRNMP, Medora, N. Dak

saw a bobcat catch one on Aug. 21. Jim (Reid J.) Reid also saw a bobcat catch one at this town once. || Burrowing owls occasionally seen, at Paddock Creek & Johnson Plateau towns earlier this yr. (1 or 2). Reid + Wheeler once saw burr. owl chase badger. Rattlesnakes present but not especially on C. l. towns. Badger seen, + many diggings, on Scout. Creek towns 1 day after poisoning with strychnine grain.

September 28/1955. Arrived at Beef Corral town 6 a.m. of clear cool day. Sunrise 6:05 (on 1/3 of town). First C. l. out 6:20. Many out, many being in shade, by 6:30. No predators seen at town by 7 a.m. ~~September 28, 1955~~ Visited small colony to E. 200 yds. from main Beef Corral colony (100 yds. S, upslope, from Beef Corral Wash). There about 15 burrows in 50 yd. square on 10% N. slope in short Bgr. Counted 6 C. l. there, 4 prob. juv. A detached group 50 yds. NE of there (4 mds.) had no C. l. visible. Took photos are. || Other extension, W. of road, where I counted burrows Sept. 26, had one C. l. (prob. adult). || At 8 a.m. saw large brownish Taxidea lying on mound 80 yds NW of exclosure. When I 50 yds. distant it into hole. Half of mound had been flattened. || I visited peak where eagles seen to perch yesterday. Rodent tooth + skull (Dipodomys?) found there, but no casts or other remains. Took photos of Beef Corral town from there. || Took one juv. (153) in traps at 7:30, another by 8:30 (154). These in area dry Bgr + some green feed. Evidently much smaller + thinner than those taken at towns where population low. These two taken 80 yds. apart. || On Beef Corral town I saw as many as 11, all apparent juvs., go in same burrow in alarm. || At E. Entrance town at 9:20 a.m. I counted 35 (est. pop. 40), most of which were at edge

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September 28, 1955 TRNMP, Medora, ~~S.~~ N. Dak.

of road (where most green food). // A live Cynomys town on N. side highway ~~between~~ a few miles W. of Belfield; another a few miles S. of Belfield to E. of highway 85. Both on gentle short grass slopes. // Clear day with mod. breeze. Drove S. to near Ludlow, S. Dakota to Ralph Jacobi ranch to see albino prairie dogs. These were in colony about ½ mile long (E+W) + ¼ mile wide (N+S, N. upslope) on 5% slope where Buchloe d. dominant. Ground cover 40-60%. About 20 white prairie dogs, some whiter than others, scattered thru colony, but about 1/3 in E. 1/5 of area. Ralph Jacobi says there nearly all albinos in E. half ~~in~~ early in summer. They had shot many but generally not the white ones (one shot; back not quite pure white, eyes pink; says R.J.). Areas of many square yards of short dry Bda cut at base, as at TRNMP. Forbs + browse little. Opuntia, Art. frig., Euph. (geyeri?), Chrys. lepto., Sphaeralcea - Trace all. Sol. triflorum green, + usually on C. l. mds. Asm scattered, <1%. Many shallow diggings in areas Afr, + even in Bda turf. At S. edge some Art. cana, + some cut (apparently by C. l.). Many horned larks. No coyote scats found. One group 5 badger dug burrows (recent) prominent. A juv. was shot. 345-78-65 measurements. Testes 6 x 4 mm., abd. Scrotum no pigment. Tail + crown freshly molted. Caecum 80 gms, stomach 30+ (saved for exam.). Much fat (5 mm. on thigh). // Another similar juv. ♂ shot. 700+ gms. Some fleas. Evidently juvs. large + fat. // Pop. density max. 12/A., but ave. about 4. Fairly uniform area - no prominent swales - but foot, at ~~no~~ stream bed end, dropped 10' down sloping bank to bench, where some burrows. Apparently much adjacent land similar + suitable for C. l. spread

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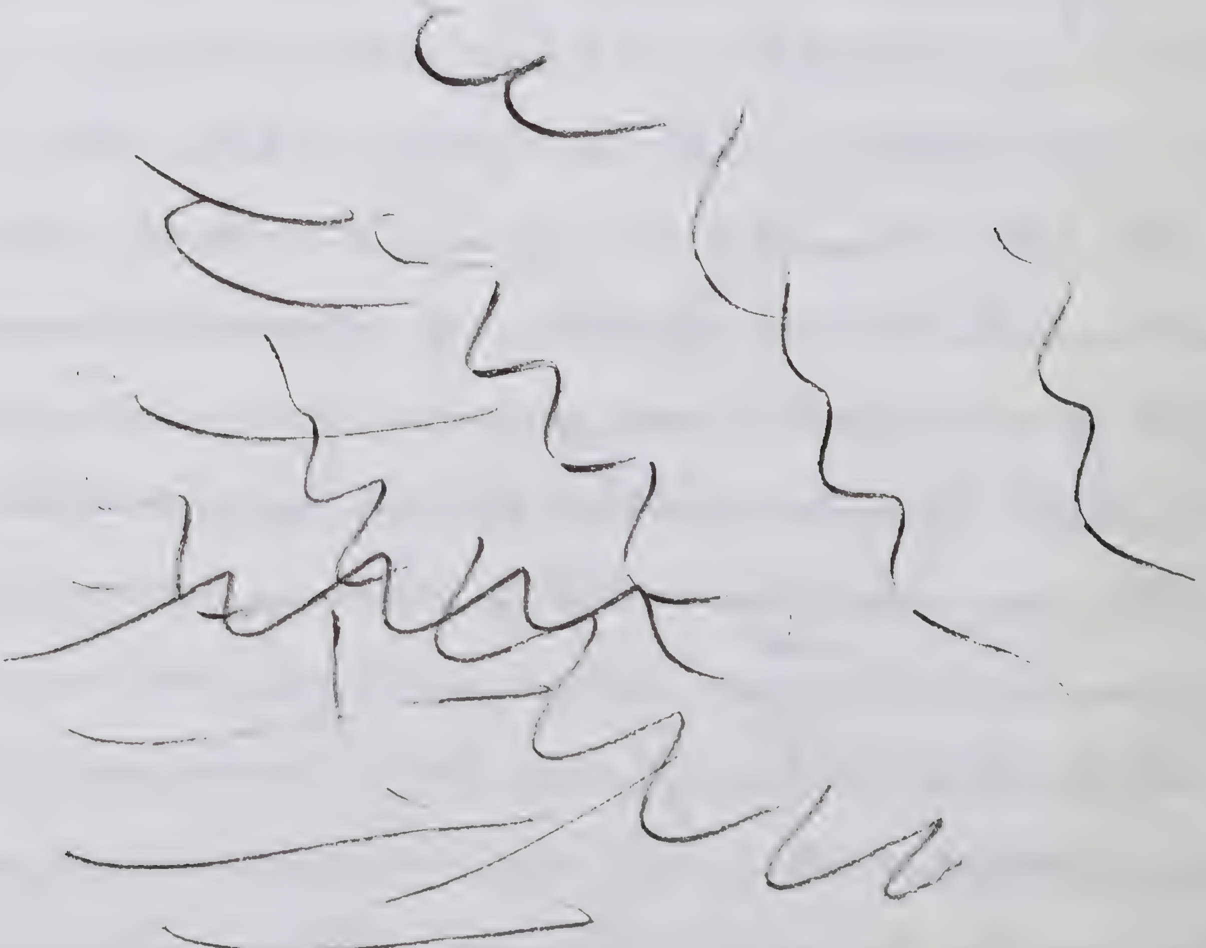
September 28, 1955 Nr. Ludlow, NW S. Dakota.

Soil silt loam. Upslope *Bgr.* became dominant. White & normal *C. l.* seen to go into same burrow several times. Town said to have been here since about 1936 (but albinos since ?). *Bdat* forb roots now apparent food. || Land of colony owned by James Clarkson, Buffalo, S.D. He had requested dogs be poisoned. Jacobi would like to keep in check by shooting.

September 29, 1955 Devil's Tower, ~~Nw.~~ NE Woming.

In census area (±1) 2 1/4 A. near road, counted 53 *C. l.* This area mainly very short buffalo grass, now yellow brown, but parts have more or less *Aristida*, & rills below culverts have thick 1' tall *Bromus* near them for several yards. *C. l.* trails thru this *Bromus* for 20' at several sites. || Some areas *Aristida* just S. of road are 100' across but patches *Bda* intermixed and a few % of *Asm* persists in *Bromus* & among weeds. Some *Asm* still green. Veg. much greener than Ludlow or TRNMP). SE 1/3 of flatter part colony S. of road is mostly *Aristida* 1' tall & sole yellow white. Old mounds 1 1/2 ft. tall allow dogs to see over grass. Population 5 to 10 per acre even in thickest area *Aristida*, where it covers (basal area) 50% of the ground (weeds on mds., of course, + some *Bda* + weeds among *Aristida*). Population in thick *Aristida* apparently lower than in *Bda* zone, where slope starts to steepen, just S. of road. Cynomys groups on mds. 50-75 yds. out in gentle slope that is a sea of 8"-16" tall *Aristida*. || Green forbs on town: *Sphaeralcea*, *Vbr*, some *Polyg. avic.*, *Melilotus* (yellow), *Aster eric.*, Solidago, some *Asclep. pum.*, *Artemisia*. Dry are Plantago purshii, Lepidium, Polygonum aviculare, *Asclep. pumila* (many seeds with cotton tufts scattered). *Polyg. avic.* common on mds. in *Aristida* zone (does this *Aristida* indicate breakdown of



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September 29, 1955 Devil's Tower, NE Wyoming.

Bda + increase Arist.?, this situation being somewhat unfavorable for C.? l.). In SW part of main flat, green Oxalis, Vlv, Sol. trifl., + Aster ericoides prominent. About 10/A. in most of area. // Counted 20 C. l. in census area #2, most being in weedy rather than Aristida zone. In 1 A. near fence I counted 16. In weedy area where many dogs, about 5% Bda + Aristida; much Plantago purshii, Asclep. pum., Haplop., Oenothera (white, blooming), ambrosia, sphaeralcea, Euph. geyeri, Sol. trifl.; 95% weeds. Zone of thick Bromus borders on 1 side. A low spot sev'l feet across nearly pure Andrap. scop., but cut to only 6" (by C. l.?). A similar spot had no parts over 4" tall. Melilotus cut at about 5," so spreading habit. Probably feed on seeds + roots much now. On N. (upslope) side, about 50' belt where Plantago purshii dominant, then Aristida. Much Plant. pursh. cut at base as if roots eaten. In this area, S. of fence colony extends 100'; then abrupt wall 1-1½' tall Bromus borders weedy zone. No expansion here this year. / About 5 holes dug by badger this SW area (more on periphery colony?). Few or none dug near display sign near road, 4 near road 200 yds. W. of sign, + about 5 at extreme W. extension. All digging apparently in or since summer. // Where many dogs in census area # 2 (+ near road too, to N. of it), much Sphaeralcea coccinea, but many kinds of weeds. Exclosure: no striking difference in composition inside + out. Main difference is lack of beat down + tramped effect within, + Aristida, Ambrosia, Plantago, + other plants about 1/5 taller inside than out. Aristida also has more seeds on plants in exclosure (C. l. eat?). Notably about 5 seed-stalks Bgr 1' tall in exclosure — none apparent outside or in C. l. towns in general. // At

Cynomys ludovicianus

September 29, 1955 Devil's Tower, NE Wyo.

W. edge colony (on flat) Asm increases toward periphery. / Where Aristida green + not dense, many plants cut to 1" or less, probably by C. l. I saw one eating seeds from the awns. / One md. had Salsola 2' tall growing on half of it. Sha now full in flower + tough + prickly; not ~~eaten~~ cut down by C. l. much (saw one nibble leaves). / In NW corner of main flat, nr. road, 24 in 1 A. This a weedy area (much Sphaeralcea) bordering drop 15' to bottom on W. Many leaves gone on Asm + stems apparently cut; probably much eaten now. / Diggings common on edges mounds + on roadbank at many sites, but generally much less than at TRNMP. / I saw some eat dry Polygonum aviculare, cutting at base, picking up, eating from base, + also eating leaves (green) without cutting. / Apparently no weeds are sought + preferred to point of eliminating them. Dys. pap. common in only a few sites, several yards across, on this town. Where 24 C. l. in 1 A., droppings average 12/sq. ft. for many sq. yds. / Roadside Melilotus in ditch + on bank - I saw 3 C. l eating leaves. Others dug down + ate roots. Plants spreading + about 4-6" tall now. // To N. of road on S. slope, Androp. scop. prominent + red-brown. Fairly quickly replaced by thick Aristida; no intermediate veget. stage. Aristida here due C. l. activity? Population generally low in thick Aristida area - perhaps 4/A - but 10/A. where thin + greener + some Asm mixed, + more weeds, nearer road (downslope). (Asm apparently found in whole colony where damper.) Bolo patches moderately cut by C. l. near Aristida dominant areas. Aristida changes to Ass at about 10% slope; ~~wh~~ [illegible] slopes favor Ass (soil texture differs?).

Cynomys ludovicianus

September 29, 1955 Devil's Tower, NE Wyo.

On census area #1, forbs 5% maximum. / N. of road at extreme W. end, where some invasion earlier this year, now in invaded zone (or beyond old Cole mapped area) to W. of ridge, + bulldozed burrows on this ridge. One at burrow in Bromus + Stipa comata is farthest W. here (few weeds; mulch cover good). // At N. side of main flat, census area #1, good cover 1" tall Bdg between burrows. Will more of area go Bb to this? // S. of road at W. end of colony, lower level: mostly Bromus, but patches Bdg several feet across. Some burrows in Bromus 1' tall + thick. Density 2 to 5/A. here. No expansion to W, or change from when I mapped earlier this yr. Saw 2 about 50 yds. S. fence where grassland penetrates into woods (50 yds. wide space). // At E. end, area of river bench apparently little or not occupied now. Unused burrows were among Rosa bushes 3' tall. Some burrows on 20' long mod. (30% est.) slope here. No recent cutting of any bushes, or Melilotus. In Melilotus patch at E. end, about 20 sq. yds. kept +- 6" tall, apparently by C. l. Dried cut stalks lying at edge tall (1½') uncut part. //

September 30, 1955 Wind Cave Nat'l Park, SW S. Dak.

With steel traps took #5 from area King's original ward A in Shirttail Canyon. In addition to these, 8 seen on this ward, 17 in extension to W + SW, 4 in area K, 7 in area $\overset{Z}{\psi}$, #6 at S. end of ward C', north of streambed. Two Sylvilagus in ward A extension to W. First animal trapped 8 a.m. (# ♀156). // Clear, + cold moderate wind from W. // Area $\overset{Z}{\psi}$. about 70 yds. from streambed, 100+ from nearest other C. l. 7 seen here (no loss since July?). / Ward C' occupied 1951. About half of bottom vegetation strongly modified by C. l. Cor

Cynomys *ludovicianus*

September 30, 1955 Wind Cave Nat'l Park, S. Dak.

different from remainder). Unoccupied part has thick *Bgr*, especially mid-way between centers activity. //Ward A: some *Vbr* & *Dpa* still green, & some *Aman*. *Cbit.*, & much *Asm*. *Potentilla* *penn.* also green. *Bda* patches partly green, but solid, uncut, & apparently not yet hard used by *C. l.* Ag Adjacent to *Bda* patches some *Schedon.* & *Aristida*. //Ad. ♀ 156 taken 9:05 a.m. in quadrat N9 (King maps); one outer feather cut off (King's mark?). //Much *Sphaeralcea* grows in Ward A still. // 9:15 a.m., took adult #157 in L A. //Ward B, I saw 2 at extreme W. end, & one at E. end in evening. *Decrease* here. One burrow evidently plugged here by *C. l.* (to shut off light?). //At a site on Ward C where grouse juvs. often seen June & July, no activity within 50 yds. now. // Norbeck Dam town. Estimated 5/A on *Bda* areas; 10-12/A. upslope from there where slope steepens & veg. mostly ~~a~~ forbs (Sphaeralcea, *Cheno. lepto.*) & more *Asm*. None seen in area for 75 yds. radius behind display sign. In part of area *Aristida* prominent in zone downslope from *Bda* zone. Near sign, ~~more~~ *Asm* prominent; ground lower, flatter. No digging for food or badger dug holes seen. One area town on slope, 50 yds. diam., has *Dpa* dominant (= more denuded? grows in unused wallows). // Lower Sanctuary town. 5 freshly badgered burrows one site. S. slope near bottom mainly solid with dry *Dpa*. To 10/A. density. On N. slope, *C. l.* mainly on area where *Dpa* dominant. Then upslope *Bgr* & *Asm* dominate, then *Asm* dominates (*Bda*, *Bgr* mixt). Some *Stipa* *comata* & then *Androp.* ~~*scop.*~~ scop. higher yet on slope (grade 10%). //Sylvan town. Area *C. l.* has brown *Dys.* *papposa* red-brown & solid. Seven *C. l.* seen, a few at least being juvs. Area of used burrows 120 yds. long & 70 wide - about same as in summer. Most

Koford 292

Cynomys ludovicianus

September 30, 1955 Wind Cave Nat'l Park, S. Dak.

Dpa & Vbr are dry. C.l. feeding among weeds, where grass rare, not at edges. No recent badger dig (since perhaps last yr.). Many forbs still green: Salvia lanceolata, Polyg. avic., much Vbr., Art. frig., some Amar. blit. At upslope edge Schedonnardus dominant for about 10' width, then Bdg dominant, then Asc. Sched. probably 1 stage higher than forbs. Here (& on Norbeck town & Ward B) a small annual dicot starting in profusion (= Vbr? or Polyg. avic.?). || Left several traps set but no catch 2 hrs. || Shot a juv. (157) at Sylvan at 3 p.m. Rather tame & seemed to be eating heads of Dpa. Found freshly cut green Vbr in two burrows. || Grass about 1% in weedy part colony. No evidence activity to N. of stream, where some were in June (or May). || Upper Sanctuary town. Counted 15 in 2A census area, but 5 of these just outside NE corner really. ~~Arch of~~ area of main use now gray due dead Vbr. that covered it. In grassy area I watched one. It scratched with forefeet in Bdg, then picked up dry bunch of grass & ate. Repeated. Also ate leaves Sphaeralcea, holding stem in one paw, not cutting stem. Also pulled up one stalk 2" tall Panicum capillare, took 1 bite, discarded. In feeding nose pushed along ground. Did not eat Carex plant encountered. At W. edge on grassy slope 4 burrows in row worked by badger, 3 being plugged & mounds demolished, & another one with 1/2 cu. yd. earth dug out, probably within 1 or 2 days past. || On part of Upper Sanct. town vegetation is 50% Androp. scop. but grazed short, 1-3" tall, & burrows among it. Where Lappula Amsinckia had been thick for many square yds, now dry, beaten down by buffalo. Several craters broken by buffalo, but repaired by C. l. (leaving large clods). No diggings for food noted. Above old fence line at only one seen, but Asm dominant & especially green there (not choice at this season!). 50' W. of old fence, in weed area, grasses <1%. No Schedonn. or Aristida belts on this colony. Opu

Cynomys ludovicianus

September 3, 1955 Wind Cave Nat'l Park, S. Dak.

common downslope from Asc on many slopes where no C. l. // On an arm of Lower Sanct. town, 2 or 3 acres have Afr dominant but apparently kept to a few" tall by C. l. // In park in general, densities over 10/A rare & local. // Near dam & water in Lower Sanctuary town, on W. slope near bottom, 11 C. l. in area 100×100', now mostly bare but having had much spreading Convolvulus growing (ate ?) (5% plant cover here). From area thick Dpa many apparently went onto bottom (where grass & green forbs) to feed, to 100' or + from burrow refuge. // In 4 A area on Rabbit town I counted 27 at 4 p.m., most being on steeper (10%) slope at W. of flat. // Ward A, counted with scope from across canyon to E. at 4:45 p.m. Saw 2 Sylvilagus there. C. l. scattered in weeds, esp. in areas Vbr. or dry Hedeoma, not at areas Osm or Bda abundance. Heard 2 coyotes near Ward G at 4:45 p.m. An antelope lay down on Ward A. // At 5:05 p.m. sunset shadow on W. ½ of Ward D. Counted 5 only in census area on E half that ward.

October 1, 1955 Visited Rankin dog town. At head (NE end) freshly badger dug C. l. burrows. In 50' diam. 3 plugged & mounds demolished, 3 dug 1-2' deep, 2 dug very deep. 40 yds distant 2 dug deep & 4 shallow in area 30' in diameter. Probably all dug within last 1 or 2 days. // C. l. scattered in several spots in area, where Afr somewhat thinner than elsewhere. Saw 25. At foot of town near edge of grass, & grass (Bgr, Osm, & other) near burrows. Others where no grass but many usual weeds, many still green (Vbr especially; Kosc, Amaranthus; Dyspap mostly dry. I shot a juv. that was exceptionally small, & saw another 100 yds. distant that appeared to be as small (♂ no. 161). This

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October 1, 1955 Wind Cave N.P., S. Dakota.

town may have 50 C. l., or even more but not thriving. Acres of Opu. apparently cut by C. l. during year, but apparently not recently as many seedstalks growing up from low shrubs 10" not cut. This town isolated by slopes + pine woods except at foot. Took photos. // At Norbeck town I counted 30 in 4 A census area at 10:10 a.m. (second count) at 10:30 in Shirttail Canyon I counted 12 on Ward D census area. The These in weedy areas principally (Vbr areas), not edges. Saw a badger at SE corner town; it went in one of 5± badger dug holes there. Apparently badger activity on C. l. towns increasing (due to failure other food?). // At Mule Creek Wyoming junction (3 mi. S. of) stopped at C. l. town that was poisoned earlier. Still 5 C. l. per acre in much of it. Bgr, Carex, + Opuntia poly. make up 95 90 % of veg. on town. Saw Sho on many mounds, + some Solanum triflorum (not eat this much?), green. Sho flowering, sticky. No diggings for food found. Occas. Art. trident. shrub [illegible] high in C. l. area. No eating cactus leaves. Rare patch of Bda. + grass still partly green. Population widespread, not concentrated. Some in flat bottom at burrows with well developed mounds, where heavy rains would probably flood them on occasion. Saw a Buteo regalis on ground in town. Found at site carcass of C. l. with skin mostly turned inside out; fresh meat. Gut, caecum, & stomach (nearly empty) lying 5 yds. from carcass. Skull showed age adult. (On previous occasion I flushed hawk from this colony). No Speotyto seen. The dead C. l. a very large ♂, tail 103, hind foot 65, femur 56. Spine separated 2 places + most ribs cut, + viscera gone, but most meat hind quarters remained. No claw marks on

Cynomys ludovicianus

October 1, 1955 Nr. Mule Creek junction, E. central Wyo

head, but apparent talon marks at small of back. Grass in mouth indicated sudden death. Discarded remains. Skin of head, neck, & forelimbs turned inside out. 4 mm. fat thigh. Apparently healthy.

October 6, 1955 CPER, Weld Co., Colo.

At 9:45 a.m. at Sec. 22 colony. 3/10 cumulus clouds; cold W. wind 25 mph. Vegetational aspect brown because of drying Salsola. Much had tumbled & piled against fences. Bgr blades green, Bdg drier, Arm green. Some forbs still green - Vbr, Sphaeralcea, Sol. rostr. (in seed); much Ska (low) still green. Gutierrezia & Chrysothamnus in bloom. None seen feeding out on flat bottom where much green Bgr. (Everywhere many Bgr seedstalks, uncut, 8" tall). // None seen E. of E. fence, where some trapped earlier. One burrow (in A'K) dug out for 1½' as if by coyote. Saw 1 coyote at NW end colony at 10:40 a.m. Many burrows showed recent repair work. No diggings for food apparent on colony. Apparently plenty of green food available. Highest density in areas of swales near 10W 4S, 18W 10S, 20W 8S. Saw 12 in second swale. // I set 10 steel traps at burrows & took one C. l. (162) by 2 p.m. Made overlay maps showing locations traps & some of C. l. seen. Extensions at 20W 10S & in area IX still used, & 2 seen in area X, within 2 chains N. of fence. // Took photos of exclosures. Inside Ska much taller than out (3-4× as tall), & Bgr seedstalks in general more numerous than outside (but many outside in area away from nearest active burrow). Saw no Spermophilus. // At Jim Lawrence's ranch I set 6 traps at used appearing burrows in area 70 yds. long. Also seven burrows appeared to be surely used by

Cynomys ludovicianus

October 6, 1955 NW Weld Co., Colo.

C. l. recently. Dogs from house had partly dug out several burrows in vicinity. Used holes on flat at base of 10% W. slope. This area had more *Bda* than any surrounding area. On old dog town area much *Ska*, & apparently many *Sylvilagus*. Low branched *Atriplex* shrubs present in *C. l.* area too. No current grazing. // Visited Wellington reserve Larimer Co. colony. In census area counted 20; adults seen there. Much *Kochia* gone to seed. Few *C. l.* where this is thick, but in open stands where low & green (*Kochia* dries earlier in thick stands?) // In horse pasture to S., 2 or 3 *C. l.* at W. extremity, but remainder apparently gassed as holes filled with shovel. Several loads of potatoes dumped in pasture, & 3 horses there. A few potatoes half eaten by *C. l.* Thick *Kochia* gone to seed. Also tall *Asclepias*. *Iva*, *Atriplex*, some *Kochia*, *Distichlis*, still green. Saw 1 *Speotyto*. Field to S. of this pasture harrowed. Two mounds & burrows apparently reopened there, & these apparently gassed & were filled. In *preserve*, area to E & SE of census area seemed well populated; possibly some from census area moved here. Took photos of exclosure showing weeds tall & thick as compared to outside exclosure. NW Weld Co., Colo.

October 7, 1955. At 10 a.m. at Lawrence ranch took up traps. Took two *C. l.*, #163, 164. A leg only of another in traps, house dogs apparently having got it. A large *Sylvilagus* in another trap, far down hole, dead. // At CPER colony took up traps & caught 4 more *C. l.* (#165-168). Marked locations on overlay map. Two other traps sprung. At NW extreme a *Sylvilagus* in traps, dead — forequarters eaten, ribs cut; stomach, gut, caecum 2" distant. I

Cynomys ludovicianus

October 7, 1955 CPER, NW Weld Co., Colo.

think hawk got it rather than coyote. About 1 mile E. of colony I saw an imm. Aquila at roadside, a Falco mexicanus flying. #165 apparently juv. taken at 20 W 10 S, part of SW invasion area. But one taken at 24 W, 2 N, a ~~recently~~ rather isolated burrow at extreme periphery, proved to be very large ♂ (#168). (At SE extreme, earlier, exceptionally large ♂ also taken. Pioneers are adults?). // Froze last night, probably first frost of fall. This may bring Citellus to den in C. l. town, tho none found here today. No Speotyto seen. Horned larks still commonest birds. 167 taken at peripheral extension near 30 W 2 N. Nr. Ft. Collins, Colo.

October 10, 1955. Visited Don Mc Millen, County agent here since about 1945. In spring of 1950 a group of ranchers in foothill area requested program to eliminate prairie dogs. F & W L Service assigned a supervisor, & 2 men employed to do work. SCS kept books. Ranchers paid about 9¢/A for approx. 500 A around 1953. After 1953 few dogs. No program this year. While there I heard of complaint of rancher near Boyd Lake; prairie dogs taking winter wheat (planted Sept.). Mc M. said reservoir areas source of trouble as not on private lands so C. l. not controlled. // Present control man is Glenn B. Terrell, Box 182, Ft. Collins (a college student). // In mid afternoon I drove N. to 7½ mi. N. ¾ mi. E. of Waverly (Sec. 13) & saw 1 C. l. in area where took 2, apparently lost only ones there, last spring. New one probably an invader this year. Set traps for it. Three burrows possibly used, in area 75 yds. diam. // In Sec. ~~24~~ 10 town,

Cynomys ludovicianus

October 10, 1955   9 mi. N. *Waverly*, *Larimer Co.*, *Colo.* sec. 10
8½ mi. N. + 1½ mi. W. of Waverly, I set 12 traps for *C. l.* Vegetation type is *Muhl. torr.* + *Eurotia lanata*, tho Bou. *Bola*, *aristida*, + forbs present. Ground cover 40% est. No fresh carnivore droppings or fresh badger diggings noted. Saw 1 33" *Crotalus* on ground close to burrows; stomach empty. On this colony estimate highest densities 7 per A., + 4 per acre common for many acres. // On area, *Salsola* common, much still green. Unused burrows have conspicuous growth on mds. *Chenop. lepto.* mostly dry now; Green *Sphaeralcea* common.

October 11, 1955 (Sec. 10) Visited traps 10 a.m. Clear, but 30 mph W. wind. No *C. l.* seen out. One trap held a *Sylvilagus* (released). No others sprung, or tracks near. I saw a *Lepus townsendi* leave a burrow, ~~bad~~ badger dug in past apparently. General aspect green here. Sheep grazing in Sec. 13 (no sign *C. l.* likewise). Set 2 more traps Sec. 10 colony.

October 12, 1955 Idea: *C. l.* feeding not equivalent to that of cattle because death returns organic matter to soil, not removed as when cattle graze, + removed elsewhere. Meat, bones, amount to considerable fertilizer. // Freshly dead *Crotalus* on road near Sec. 13 burrows, but stomach empty. No *catch or sign* at Sec. 13 burrows – was the one seen there a transient? Clear, cool, + calm today. // In Sec. 10 in area where *Atriplex* 2' tall, I saw 2 burrows with 5 *C. l.* each at them. These near foot of gentle slope at edge flatter area. Plants present: *Atriplex*, *Eurotia*,

Cynomys ludovicianus

October 12, 1955 9 mi. N. Waverly, Larimer Co., Colo.

Salsola, Bgr, Bda, Muhl. torr.. Shrubs show no recent cutting (Eurotia 8" tall). Apparently C. l. had eaten most green Salsola leaves nr. one burrow. I set 3 traps where several c. l. seen. Took up all other traps in Sec. 10. // At N. (upslope) edge colony a burrow freshly dug out by badger (last nite?), & one 10' distant plugged, mound destroyed, with C. l. seized hole up thru mound. Some stems Eurotia cut earlier this year still present, dry. // My 15 traps held 1 C. l. toe, one fouled (body taken by carnivore), ♂169, & 1 missing (mammal larger than c. l. took drag). Saw a Lepus townsendi jump from same site where seen yesterday (today in scratched out form, 16" long × 4" deep, 4' from the old burrow). // ♂169, an old large ♂, taken 11 a.m. at mouth 7" diam. burrow on 5% E. slope. About 3 C. l./A. there, & ground cover only 25% (est.). Main plants Eurotia, Salsola, & ~~Muhl.~~ muhl. torr. for 50' around hole (these = 95% or +), but traces of Dys. pap., Arm, Bda, Solanum. As other ad. ♂♂, deep red-brown stain genital region. Weasel-like smell seems to come from glands on chin, not anal glands. // Visited then an old C. l. town in unploughed section 9, 5 mi. W. & 2 mi S. of Dover. Main aspect of dry dead Salsola bushes, but scattered low Atriplex & Chrysothamnus. Town on gentle slopes both sides of winding bottom containing standing water. Bgr principal grass, almost only one on E. aspect slopes, but Bda present on W. aspect slopes. Sphaeralcea common. I saw one C. l. eat Bgr, cutting dry seed stalk & eating it, discarding head. Soil texture light, silt loam, with gravel. At S. edge field Dipodomys sign. Recently planted grain field adjacent on S. side; grain few in

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October 13, 1955 Nr. Dover, Weld Co., Colo.

than tall. No present C.l. burrows in field tho in adjacent un-ploughed ground (probably some control by grain rancher). Where most dogs Bgr 2/3 of composition. Shrubs not recently cut by C.l. Formerly cut Atriplex, even 1' above ground. In gen'l Sha comparatively thin for 10 yds. around mounds, so Bgr shows up more there. Apparently mds. here many years. A few mds atop low broad mds. 10 yds. across + 2' thick, as if C.l. had built up this mound over long period. Atriplex, hedged low, on same mds. Woody Aster (commutatus ?) only 1"-2" high but spreading on one mound. Many ant mds. in area. Ant clearings usually surrounded with tall Sha. Opuntia common. Much dead Bgr near mds., perhaps partly result C.l. activity (dead stubs). No grazing here this year (no tracks or droppings). No badger diggings. Droppings of apparent dogs on some mds. Most shrubs only 10" tall. On bench near bottom, trails of bare ground thru Kochia 10" tall, connecting burrows. Cirsium 2' tall not cut. No apparent concentration dogs or burrows near water. Diggings as for food are rare, tho some at base cactus (eat roots?), or atriplex, to 6" deep. Clear indication tops of Bda & Bgr are common foods now. No new burrows noted. Saw one Marsh Hawk over dog area. Kochia mainly on flatter areas, where perhaps damper, saltier. Some burrows partly roofed at entrance by Atriplex. Burrows apparently all within 200 yds. of lowest bottom (~~at~~ streambed). Slopes to 10% occupied. Population thin, possibly reduced or eliminated some areas by man. At N. end ~~at~~ especially many burrows apparently unoccupied for a few hundred yards. Occupied areas in gen'l in or adjacent to areas of more conspicuous grass. I think there would be much less Sha

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October 12, 1955 Nr. Dover, Weld Co., Colo.

cover if high population C. l. here. Grass not vigorous & not evidently more in part of pasture where no C. l. // Idea: Introduced forbs (Kochia, Salsola) may have greatly altered food supply & total effect of prairie dogs (effect kind disclimax produced ?).

October 13, 1955 Larimer & Weld Cos., Colo.

With Willard Graves, Range Conservationist, Soil Cons. Serv., Ft. Collins, visited Wellington reserve, CPER, Sec. 10 (Ackerman) colonies. At Wellington colony Graves agreed that evidence indicated C. l. killing brush & keeping it low, both Chrysothamnus & Atriplex. // Soil. Graves thought Aristida on C. l. towns might well indicate letups in grazing intensity rather than downward trend. He said that Bout. grac. dies when covered, so wind blown soil makes native range poorer on untilled land adjacent to ploughed. Muhl. torr. he regards as invader, only on overgrazed sites, coming in when Bda depleted. He agrees that Bgr more on slopes & lighter soils as compared with Bda on lower & heavier soils. Sheep, he says, prefer ~~Bd~~ Bgr - Bda to Asm, so ~~that~~ latter may be in high % age tho utilization heavy. In gen'l he knows of no C. l. towns in range above fair condition. // Graves considered CPER colony to be "plains upland" in fair condition. (Bgr probably greens up earlier than Bda). Possibly C. l. increase wind erosion by increasing bare ground. I noted several ~~spats~~ spots where C. l. now cutting areas of Bda close to or under ground surface, the whole having scratched up appearance, & grass cut (1" tall) easily scraped off with fingers, leaving few stalks showing on bare ground. Much of Bda still

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October 13, 1955 Weld Co., Colo.

green. One trapped Oct. 7 near 20W 10S had Bda stolon in stomach. No evidence that Muhl. torr. eaten. At SW extension edge, one burrow apparently badgered this summer. Large Sha dry there, much Bgr, & little Bda, at edge of invaded area (lack Bda inhibited spread?). // At Acor ranch near Rockport, a thin but extensive cover of Bda on ground. I had thought it would have been much more barren. Much cactus here & on adjoining ranches. Acor has thin Bda in spite of heavy long use by buffalo & by C. l. - not denuded at this season. Obvious eating of Bda same areas. Bgr present but scarce. // At Sec. 13, 8 mi. N. Waverly, took up 3 traps set there. No sign of a C. l. A Sylvilagus foot in one trap. Traps set at mouths burrows. // Sec. 10 Graves considered "poor" condition & going down. Much muhly & widespread Eurotia, including young plants. Saw a Lepus townsendi same burrow as yesterday. // Ft. Collins, Colo.

Talked with Charles Terwilliger of range dept. about nutritive value range plants. He said stage of growth & part of plant eaten of greater importance than species of plant, in protein & phosphate content. Cattle prefer fertilized plants - not known why. Strips fertilized; cattle prefer these. Also seek grass where dung fell last year (but avoid when fresh dung). Nutritive value of parts plants unknown in gen'l. Nodes of stolons probably highly nutritious, & bud & stolon of Bda more nutritious than leaves. Don Hervey has done work on this. Albert Reid agrees that little known about plant nutriment quality, especially little in forbs.

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October 14, 1955 9 mi. N. Waverly, Larimer Co., Colo.

At Sec. 13 area found no recent sign. At Sec. 10 I set 16 steel traps, covered, at mouths burrows. Also set 15 snap traps near burrows to sample mouse population. Dog town has not expanded to E. - no occupied burrows east of section line fence (dogs seen there early this yr.). A few apparently this-year's burrows high on slopes above old, but those examined apparently not now occupied. Bahia oppositifolia now common green forb, tho much less than Sphaeralcea. Saw one Lepus townsendi

October 15, 1955 With Paul Maslin + 4 other men searched for Crotalus at colonies in Sec. 10 + Sec. 23 (Ackerman's), + at CPER Sec. 22. Found no snakes or reptiles. Clear, warm, light breeze. Checked traps at Sec. 10. Took 1 Onychomys (071770) in snap traps near C. l. burrow. Took 3 C. l. (#171, 172, 173) in 15 steel traps by 11:20 a.m. Much new about Sko at Sec. 10 colony. At Sec. 23 some digging of onions. Asm green + 4±" tall, in scattered thin stand. Population thin, but 6± in / A. outside section fence at SW corner. 1% Aristida, 1% Asm + Bgr; + Sko, Eurotia, Atriplex. More vegetation there but little grass. Freshly dug badger hole there. No obvious large expansion colony in that direction. Dogs rather tame on E. slope in NE portion colony. Saw 1 golden eagle nr. Sec. 10 colony.

October 16, 1955. 7 mi. N. Waverly, Larimer Co., Colo.

At Section 10 colony, 15 steel traps left same places yesterday held one C. l. (174) and an adult Taxidea. Badger in #1 trap held by a large spike at mouth of a burrow. The burrow entrance + adjacent ones not badger dug. Saved badger for stomach examination. Took up 4 traps + left

Cynomys ludovicianus

Colo.

October 16, 1955 N. of Waverly, Larimer Co.,

11. No catch in 15 snap traps left same sites as yesterday. One steel trap held juv. Sylvilagus. // At some sites 1" Bgr turf had been heavily eaten at edge, blades torn up, evidently by C.l. Eurotia in seed now, shedding heads, but saw evidence eating by C.l.

October 17, 1955. Took up steel traps at Sec. 10. No C.l. taken, but one juv. Sylvilagus (this + one yesterday ~~in crater~~ at ~~burr~~ burrow with crater mound freshly built, + only 3" high), both very young juvs. (A Sylv. taken at Sec. 13 at C.l. ~~burrow~~ burrow about Oct. 12 too). Today clear, dry, mod. N. breeze. At Sec. 10, 11 Antilocapra on colony area. // On Sec. 10, Bda eaten over area 1-2 sq. ft. at some sites. Bgr eaten at many sites. Gnaws in hard mat, + eating mostly at edges, with scratchings there. Bda rare above ~~Bgr rare grass~~ bottom, but Bgr common. Bgr highest % composition atop low ridges, but fewest C.l. there (ft. slope preferred). Bgr now taller, greener, than Bda, which is thin, dry. // At large crater where we trapped + 5 apparent juvs. seen sev'l days ago, none trapped or seen (no sign) since. Disturbance of trapping probably causes abandonment. None of about 10 other traps on used-appearing mounds sprung since yesterday noon (to 11 a.m. today). Asm green + blades 4" tall on some clearings around burrows, but not cut (no seedstalks present). // Muhlenbergia apparently not eaten though green + adjacent + interspersed patches Bgr eaten. Much greener here than towns seen last month in N. Dakota + NW S. Dakota. No diggings for food noted at Sec. 10. C.l. wary here + rarely seen within

Cynomys ludovicianus

Colo.

October 17, 1955 N. of Waverly, Larimer Co.,

distance of 100 yds. || At Sec. 23 colony, now near to E. of the gully, tho some 100 yds. E. of it this summer. No recent grazing here. Some antelope tracks. Much washing down gentle slopes by water - the burrow mounds seem to divert well this kind of washing. Very little recent digging for food! Only sites where much digging is in washes or near E. edge where little new green Elea. Elea green + new, 2"-6" tall, over much of colony, + this being eaten by one when I shot it. No sign of feeding on Atriplex or Eurotia recently, tho these plants dominant over much of colony. Green Asm 4"-6" tall in very open stand over much of colony, but no sign of eating it. Sphaeralcea + Bahia (also Eriogonum) green + widespread but not abundant. One green Astragalus seen. Chenopodium leptophyllum long dry. Probably Salsola main food. At upslope edge of N. arm, erosion pavement of red pebbles covers most ground, but mounds there. One burrow dug in shale, so mound of shale fragments to 2"x2" size. At upslope edge N. arm, Bgr turf increases, but dominant only outside colony where slope steepens. Nibbling of very short Bgr evident at periphery colony. Muhly patches in much of colony, but vigor extremely poor, + no evidence eating it. At some sites upslope part N. arm, 3 dogs gathered on one mound. Rather tame in N. arm, + I shot 6 there. Two (#175, 176) taken at upslope edge seemed to be large adults. Sly Sylvilagus apparently can dig a shallow burrow under Atriplex bush,

Cynomys ludovicianus

October 17, 1955 11 mi. N. Waverly, Larimer Co., Colorado.

so may add to destruction of brush some sites. Shot 175 to 181 for examination. Population thin but widespread, with maximum about 6/A. + average. Areas between washes especially low population. Most burrows on slopes are bordering shallow washes down slopes.

October 18, 1955 1 mi. N. Rockport, Weld Co., Colo.

at C.C. Acor ranch I shot 6 Cynomys for examination (#182-187). Rather tame here. Mostly in lower parts slopes, many 10% slopes away from bottom not occupied tho essentially no control here. Several C.l. on s. side fence on next ranch, but no large expansion in that direction. Soil vegetation a very short dry turf of Bgr-Bda, some Aristida + Asm. short remnants Chrysothamnus + Atriplex. Gutierrezia, ~~Lasa~~ Iva, Sphaeralcea, Art. frigida, Chenopodium (dry), Bahia, Opuntia, Sha. Bda much cut at base leaves some sites. Saw 1 Lepus. Sylvilagus common here. Soil pale gray, mounds of clay loam, surface silty. Ground cover about 40%. No eating of cactus or digging for food noted. Dogs fat tho pasture poor. // At 3:40 p.m. I arrived at CPER colony. Dry wind est. 25 mph. Saw 5 in area IX, near exclosure. Saw a Sylvilagus on mound in MB. Freshly badgered burrow near bottom in FD, + another 30' N. of it. Sha here is dry. Bottom has thick Eurotia appears dry, from distance but most leaves green. Grubbing of thin Bda near burrows. No apparent current activity out on Bgr bottom. About 4 p.m. I saw 2 golden eagles,

Cynomys *ludovicianus*

October 18, 1955 CPER, Weld Co., Colo.

one an anim., over knoll just N. of town (another nr. Carr; so eagles rather probable predators on *C. l.*). At 4:15 I saw a *Crotalus* lying stretched on ground 10' from burrow near 6W2S. It was 36" long, stomach empty. At 4 p.m I shot one (188) near 18S 1W (quadrat A1). At 4:20 shot another (189), 10 yds NE of of 10W8S (in ID). Green Verbena bract. common in bottom. *Solanum rostratum* in seed there but apparently not eaten.

October 19, 1955 Terry Ranch, NW Weld Co., Colo.

Spent 2½ hours with Mr. Murphy of Warren Live Stock Co. looking at present & former *C. l.* town sites. Range used by cattle summer, sheep winter. Dominant grass blue grama, tho some *Bda* in bottoms, & conspicuous *Asm* on *Stipa comata* some sites (*Stipa* seeds work into sheep meat; undesirable on sheep range, but excellent early feed for sheep & cattle). Range in general in fair condition, I judged, & greener than CPER. // One site invaded & about 12 burrows dug in 1953. This near a sheep corral (100 yds.) on gentle slope where much *Bgr* turf & much *Opuntia* (NW ¼ of Sec. 26, T12N, R67W). This was poisoned '53. Site 2 miles from a large town 3 mi. N. of Carr, mainly in Sec. 3 (T11N, R67W). Visited site of this town, about 2 sections in extent. Only one *C. l.* seen. Poisoned for last 3 years by Crouch. Vegetation generally *Bgr*, ± ~~the thin + *Asm*~~. On gentle long slope going out to S. from hills. Burrows widely spaced. Formerly many dogs & little vegetation left (drought '52 to '54). Excellent some

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October 19, 1955 NW Weld Co., Colo.

lack of Bgr this yr. (Murphy here since ~~1918~~ 1919. Range about same now as then, but poor in drought of 1930's & drought of last few years). Murphy had never seen or heard of a black-footed ferret. // Another invaded area was a bottom only 100 yds. wide where Bgr main vegetation. This poisoned this year for first time, but at least 10 C. l. remain. Small colony. Perhaps 3A up & down canyon, bordered by steeper slopes. // Another invaded area on a 3/5 % (or less) slope where Bgr dominant. Many burrows, but poisoned (1953 invasion too). This 300 yds. from a windmill, about 1/2 mile E. of Gleason on U.P. railroad. // One of invaded areas in NE 1/4 of Sec. 12, T 12 N, R 67 W, in Wyoming, 4 1/2 miles from main large town N. of Carr. // 2 areas had new towns 1953, about 2 mi. from Carr colony (nearest probable source). // To west of highway 87, 3 towns at sheep camps. About 1 mi. from road remnants of a few dozen holes on 10% slope where ~~then~~ Bgr sown (30% ground cover), 100 yds. from sheep shed, 200 yds. from edge reservoir. A similar one said to be at another sheep camp, close to buildings & bedding ground. A town still active at Graves Place (T 12 N, R 68 W, S 28), tho poisoned three times. Another at Lower Jack camp, near Tony Romanos place; & near Bulger Camp (T 10 N, R 68 W). // In general few dogs left & repeated poisoning eliminating these. Total extermination is the goal. // Another town, new, poisoned this year, in SW 1/4 of Sec. 18, T 11 N, R 67 W. I visited this one. About 50 burrows in 4A. No sign of dogs now pres

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October 19, 1955 Nw Weld Co., Colo.

ent. ~~Be~~ Burrows in bottom of about 5% slope between hills 100-200 yds. apart. Bgr dominant. Ground cover 25%. Trace of Asm, Chrysothamnus (8" tall), Ska, Opuntia 2%, Eriogonum, Sphaeralcea, Applopappus, Munroa, Aster, Gutierrezia. Bgr seedstalks conspicuous in irregular areas, to 16" tall. Several burrows in fill over gas line, tho only 2' wide, suggesting that bare ground or ~~bro~~ broken ground favored for burrowing. This fill also lined with Ska (summer food). Soil texture medium (med. to light on most of Terry Ranch). A line of telephone poles thru area. One near center burrow area had 50± splats whitewash on ground, a few eagle feathers, & a large cast (collected); good hawk perch. // Much of range of W.L.S. Co. in Bgr in bunchgrass form, not appearing overgrazed. For sheep, Asm + Stipa not highly desirable.

Nr. Ft. Collins, Colo.

October 20, 1955 With Dr. Beidleman & his vertebrate ecology class visited Spring Canyon dam colony. Mr. F. C. Goodell, owner of pond at N. end, says C. l. there at least 20 yrs. to his knowledge. Water in lake until 4 yrs. ago. Then water table dropped; now about 28 feet. In morning at 9 a.m. I saw 6 C. l. to N. of fence, 4 to S. Most on Bda areas. Well scattered over mapped area. / Class dug at 2 burrows. One crater burrow went down at 45° angle to 21" deep, then dropped vertically about 2 feet, then turned toward horizontal. Topsoil was about 20" deep, then gravelly layer & hard dry clay below. This burrow near no. 8. Another dug in edge

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October 20, 1955 Nr. Ft. Collins, Colo.

of old pond. This one went down at gradual slope in straight line so about 3' underground 6' from entrance. Soft wet clay at surface, but hard dry clay 2' down. Digging very difficult. // One group of students mapped burrows on a 5 A plot to S. of fence on Bda slope. Others measured amount of soil in mounds by filling bag of known volume. Another measured slope of burrows farthest up the limestone ridge at E. side colony. // A student named Allen M. Wendland counted 17 (6 + 4 juvs.) & perhaps 22 on this colony, S. of E-W fence, in early April 1952 (fide report submitted for course). K. G. Hay & D.E. Kelly, in May, 1954, watched for 12 hours & saw maximum of 16 prairie dogs. Their plot of burrows (215 judged currently used) shows greatest density in bottom at N. end (only part S of fence surveyed). 81 called inactive. All in area of about 26 A (my calculation), slightly over 11 burrows / A.

October 26, 1955 Boston, Mass.

at Amer. Ornith. Union meetings talked with Victor Cahalane, formerly chief biologist of National Park Service now at New York State Museum, Albany. He knew little of the poisoning in Wind Cave National Park. However, he had worked there as a ranger about 20 years ago. He said ~~that~~ in middle 1930's the park forage was poor because of long overgrazing. He also told me that the Norbeck Dog town extended E. of the highway even 20 years ago. He took no notes on prairie dog status at Wind Cave, however,

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October 31, 1955. Bar Harbor, Maine

talked with John King about his prairie dog study in Wind Cave N.P. Looked at his color slides, 35 mm. prints, & raw notes. Showed him my slides of Shirttail Canyon. He noted little change in general appearance of the area except ~~that~~ Bromus line had been pushed back on Ward A. He said ~~that~~ buffalo had been a nuisance on Ward A during his study (1948-50), & ~~that the~~ wallows had been there as now. / Sometimes prairie dogs start to fill a burrow when there is a disturbance there. Once seen to start to fill hole ~~when~~ after a dog entered. / Excavation of burrows had been near center of east side of Ward D. Vegetation map (p.15 of printed report) made July 3, 1950. / King saw C. l. chew down mullein stalks. He trapped some Microtus on Ward C. / Peromyscus maniculatus. King set 19 traps on Ward A on July 12, 1948 & took 3, alive. By August 6 he had marked 18 in the 5 A. of Ward A. So at least 3/A. / In 1950 some burrows in ward C, not all made there 1951. The 1950 invasion was of area where some old burrows already. / Movie shows C. l. running atop snow in February. / Little vegetation on Ward A until June. / C. l. seen to eat leaves thistles; shown in photo. / King orig. notes had different grid designations than printed (~~NE corner of~~ TT in orig. notes is Mi in printed; staked with 4 bands ≡ there at NE corner this quadrat). // Snow tracks Mar. 15, 1950, showed no connection between coterie territories. // Citellus 13-lineatus - seen to enter C. l. burrows, & seen in Ward A. // Eagle

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~~Novemb~~ October 31, 1955. Bar Harbor, Maine

seen low over colonies July + Aug. but not seen to make kill. Snow marks indicated one kill (K. has photo of track). Copy of note by J. Estes Suter, ~~fal~~ Nov. 2, 1942, at Wind Cave, says Suter saw eagle catch a C. l. on "Custer RDA." Eagle flew low, slow. Dived. Came up with C. l. Flew short distance. Landed. Fed. Other C. l. showed little alarm. // King trapped 80 C. l. on Ward A in 1952. He estimated this number to be about half population then. Some marked in 1948 recaptured 1952. // Borrowed some photos from King that show vegetation during his study. Decrease taller grasses, probably brome, evident by comparison my photos and those of King. Where much brome 1950, little or none now, in some areas.

Nov. 1, 1955 New York, N.Y.

At offices of Conservation Foundation talked with Fairfield Osborn + Mr. Snyder concerning report on the prairie dog project. Osborn seemed interested in relations with other animals (= large mammals ?). Emphasized need to reach people that could act on the particular problem, + write for them (probably USFS, F+WL Service, NPS, SCS personnel, ranchers, Fish & Game dept. men). Actually got little specific or definite from these men.

November 2, 1955 At N.Y. Zool. Park talked with John Tee-Van, Lee Crandall, Mr. Schiemann, & others about the project. Again little definite on subject matter. Tentative plan is to have paper covered report of about 100 pages, illustrated as necessary,

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November 2, 1955 New York, N.Y.

to be ready April 30, 1956. As soon as practical send sketch of content for suggestions. Remain in Colo. until end of year, then work at Berkeley.

November 4, 1955 Washington, D.C.

At US Nat. Museum, Stanley Young told me that his black-tailed prairie dog pet had hibernated (contradicts his printed acct.?). He says Wichita Mtns. range very much "beat up" by grazing in 1935. Viola Schantz helped me find specimens + files. There is card file with many notes by V. Bailey and others, filed by species + subspecies + state. This apparently not kept up, but old information excellent. (= the "Merriam file"?) Copied many portions of these notes. Has original info upon which reports by Bailey, Nelson, Cary, + others have been based. Merriam has some notes in file but no direct reference to the huge C. l. town he tells of in 1902 Yearbook Agriculture. Early estimates numbers often based on number holes per acre, according to this file, maxima being 25 to 30. C H Merriam probably used this estimate of 25/A. and general size of rather continuous C. l. population described by V. Bailey. / V.B. note of Aug. 1892 tells of abundant C. l. about Wichita Falls and from there 51 mi. SW to Seymour in "one continuous dogtown." They will certainly average 5 to the acre throughout this distance." Estimated 3200 dogs/section. Along Ft. W. and Denver R.R. from Wichita Falls to the crossing of the Prairie Dog Fork of Red River, numerous. "This

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November 4, 1955. Washington D.C.

region contains by far the most extensive population of prairie dogs that I have ever found." A 1918 note of VB concerning same region says dogs about 10% of former nos., due poisoning mainly. // Remington Kellogg says that (in early 1900's?) in Trego Co., Kansas, he saw prairie dogs filling up a burrow after a rattlesnake entered it.

November 5, 1955. Patuxent, Md.

In files in "Merriam Bldg.," a card for food habits of *Buteo lagopus*, Sept. 30, 1913, examined by E. R. Kalmbach, from New Mexico; stomach cont. 85% remains of *Cynomys*. (In gen'l *Buteo lagopus* feeds on rabbits + *Peromyscus*). For *Falco mexicanus*, Oct. 2, 1913, E. R. Kalmbach, 75% *Cynomys* in one stomach; Koehler, New Mex. Food of *Taxidea taxus*. *Cynomys* in stomachs of 3, New Mexico, Sept. 1904, by V. Bailey - also one (*C. leucurus*) from Bitter Creek, Wyo., Sept. 16, 1893; V. Bailey. / No records stomach exam. ferrets here at Patuxent. / Rattlesnakes (*Crot. atrox?*) - 18 examined by Biol. Survey included 2 with prairie dog remains stomach, 1 with p.d. + cottontail; 4 with spermophiles (note by Lantz).

Nov. 4, 1955 Washington, D.C.

Visited Dorr Green + Clifford Presnall at headquarters of predator + rodent control div. They gave me recent sheet on broad policy. They said present policy for prairie dogs is to control only where there is complaint, not to exterminate. Told them of general scope of my project.

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November 7, 1955. **Washington D.C.**

Richard Griffith, F+WL Service says several dog towns along breaks of (Little?) Missouri R. in Ft. Peck wildlife refuge, Montana. Fred ~~Saunton~~ Staunton (sp.?) manager. Rough country & some areas no grazing for 20 or + years where there are prairie dogs. § Ben Osborn of SCS proved to be a quiet man not sold on his interpretation of situation reported at Grace Mtn. dog town in 1946. He said he made best estimate with facts then at hand. He said he too had noted absence mesquite at prairie dog colonies. He had photos of some sites taken in Dec. 1949; photoed Sept. 1946 still much Aristida then. Comparison my 1955 photos with his of 1946 & 9 showed range now much improved (tho still apparently suitable for C. l. establishment). He had no kodachromes of range there, & no photos of Official dog town. He & P. Allen had run the transects there. Requested copies of his photos of Grace Mtn. town area 1946 & 1949. He said that seasonal differences might produce much Aristida. // Talked briefly with H.E. Graham of S.C.S. & told him of my study & approach. He agreed that we need many ecological research stations engaged in long range, rune research. Seemed very much interested in relations rodents & grazing. // At College Park, Md., visited F+WL information office where black & white photos & large color transparencies are filed (2X2 kodachrome slides in Dept. Inter. Bldg.). Rex Schmidt in charge. FWS 3228 by CR Kalmbach is good shot of 2 dogs on one mound. FWS 29 is good side view coyote in blue grama, by Haddon. Some photos or data on back

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November 7, 1955 College Park, Md.

provided information. Photo B 24769, S.E. Piper, Sept. 19, 1922, 2 mi E. Aurora, Colo. Shows C. l. burrows in area 6" tall alfalfa where cover about 50%; taller uncut (by C. l.) alfalfa in background. C. l. cuts alfalfa. / B30769, SE Piper, June 11, 1926. Dan Berrian Ranch, Conifer, Colo - 7300 ft. Mountain meadow. ~~Perhaps~~ mds. said to be Cyn. lud. at upper limit range. / Some photos alfalfa field infestation by Zuni prairie dogs. All show widely separated tufts alfalfa, not dense stand. / B42927, L. Knowles, 1934. Fall River Co, S. Dak. Cornfield with prairie dogs. 1/2 fr veg. is weeds. Cover about 30%. Dogs cut corn stalks. / B18601, J. S. Silver, July 25, 1918. Aurora, Colo. Area in wheatfield destroyed by C. l. Tufts 6"-12" tall + much open ground near burrows; tall wheat background. / B18602 J S Silver, July 25, 1918. Area in cornfield destroyed by C. l. Tall corn background. Aurora, Colo. Few stalks over 1 ft. tall standing. Low weeds prominent (80% of veg. where C. l.), but only 20% cover where C. l. / B36042a. By A E Oman. 1929. Clark Co., Kansas. Wheat 6"-10" near C. l. burrows; to 2' at short distance. / B59602. D.A. Spencer 7/17/40. SW Colo. Oat field near Mancos, Colo. Seed heads cut + eaten in gradually deepening semi-circles from borders field, says accompanying info. / B19716, N.H. Kent. July 2, 1919. New Mexico. Burrows in wheat field. / B 36696. Aug. 1, 1930. R. S. Zimmerman. Nr. Green River, ~~Uho~~ Utah (Cyn. leucurus probably). Mds. in good tomato crop March 10, 1930. Tomat-

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November 7, 1955. College Park, Md.

oes in rows, open ground between, to 1' tall plants. / Photo B41384, 3/5/35, H H Hoyt, + 43557, Mar. 3, 1936, W B Bell, show Gracy Mtn., Wichita Mtns.; ~~very~~ close grazing + many cow (bison?) chips apparent foreground. // Photo B 26922, by L. C. Whitehead, May 1924. Texas, Greenville. Says on back - 7 yrs. ago Mr. McIntyre released 4 young p.d. about 13 mi. SW Greenville. Since then propagated + spread until covered 15 A. 392 live holes counted. / B19712 by N H Kent, July 3, 1919. New Mexico, Moreno Valley, Colfax Co. 1872 dead Cynomys in piles. // B 825M. Ariz. Pile of 1641 Cynomys collected after one nights operation. Closeup of pile. / Photos by Jas. Keyes show operations in Weld Co., Colo, in 1923. // SP Young photos of 1933 show Navajo and Zuni Indian poisoning crews on horseback. ECW camps on N. Mex. Ind. Reservations 1933.

November 8, 1955 (sent by S.E. Piper) USNM, Washington D.C.

High altitude 3 specimens in USNM museum from Conifer, Colo, 7300 ft, June 11, 1926. / Also an albino specimen from San Angelo, Texas, Oct. 8, 1915, 25 mi. SW of Doorkey Ranch. No. 210241 Biol. Surv. WB Keasea (spell?). All white pelage. / Note in Merriam file under C.l. under Mustela nigripes concerning Arizona. W.P. Taylor, Dec. 2, 1933. Ash Flat, San Carlos Ind. Res. Ben Foster, in charge pred. + rod. control, Arizona, says prairie dog populations this area decreased to less than one per cent its former status within the last two years. Cause, ultra dry season, weakening the dogs, followed by heavy snow

Cynomys ludovicianus

November 8, 1955 USNM, Washington D.C.

fall, which apparently drowned them out." / As to Burrows. A card in Merriam file gives compilation by Jas. Silver on burrows of 7 Cyn. gunnisoni, 2 Cyn. lud. One C. lud. excavated by WH Osgood in North Dakota had 5 entrances, 61' long main tunnel, estimated volume (assume 5" diam.) 8.2 cubic feet. One excavated by C.M. Yerrington, St. Xavier, Montana, Oct. 30, 1915. 1 entrance, 28' main tunnel. Nest 20"x20" another 16"x 16" enlargement. Vol. 4.6 cu. ft. (est. 5" diam.) / One under Cyn. gunnisoni but with locality Delphos, Kansas, must apply to Cyn. lud. - excavated Oct. 1910. Max. depth 7½'. Vol. 3.1 cu. ft. Nest 10"x10"? another enlargement 6"x8"? (? marks in Silver notes). One entrance; main tunnel 18½'. // File gave several records ranches near Denver, Colo., with C. l. One had 24 live + 9 dead burrows, on 2 acres of cultivated land 11 mi. E. Denver; W.P. Taylor 1918 note. // Streator collected & found abundant at Loveland + other sites 1894 / Cary, Sterling [Colo.] region, May 27 - June 2, 1910, wrote probably driven out as most of area settled up. // Lantz, note for Higbee, Colo., April 12, 1910. All ♀♀ had given birth judging by carcass exam. Uteri showed 6 scars in 6, 4 scars in 2. / Cary, 1909. Extensive town between Boone, Colo., & bluffs to east. Common along Santa Fe R.R. track east of La Junta. / Las Animas, July 1892, very abundant. Also Trinidad. Fisher note. / Lantz note. Hugo. At Byers a colony with albinos, a dozen seen at a time. Sept. 1905 / Gardner, Colo. 10 mi. E. Badito. Range probably overlaps C. gunnisoni at about 6600 ft. Cary,

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Nov. 1907. // S.G. Jewett noted them abundant near Arvada, Wyo., in Aug. 1913. // Cary, 1909, found nearly exterminated in Ft. Laramie - Lusk region. // V. Bailey apparently estimated number dogs by number burrows, even in 1913. Estimates of ave. nos. by Bailey & others rarely over 12 dogs per acre, & many Bailey estimates only 2-3/A. // North Dakota had relatively few records C. l.; Jewett, & R. Kellogg (1915) mention in notes. // Kansas: D E Lantz noted formerly abundant, mostly destroyed by 1905. // V. Bailey in control work Texas, San-Angelo region, in 1892 & again 1918 - only about 10% of prairie dogs at latter date as former; I copied some of his notes in USNM files on this subject. Ft. Collins Colorado

November 16, 1955. at 2 p.m. visited Spring Canyon Dam colony. Snowed morning of Nov. 11, & cold & more snow since. No new snow since noon Nov. 15, & about 1" fresh light snow still on ground - excellent for observing tracks. Many rabbit & dog tracks present, & a few mice, but only 1 burrow found with apparent C. l. tracks near - ~~the~~ these went no more than 3' distant from hole (#10). Apparently almost no activity above ground today or yesterday at least, & below freezing throughout both of these days.

November 24, 1955 Visited Spring Canyon Dam colony about 2 p.m. No snow now on ground there. Counted 24 C. l. & made overlay map of locations. Areas occupied same as in summer, no extension back

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November 29, 1955 Nr. Ft. Collins, Colo.
into the northern "horns", no contraction out of southern "horn." Later had 3 C. l. near one burrow, but in general dogs were seen singly. Good cover of curly Bda about 1" tall, & cattle still grazing on part to S. of fence. Much more grass cover than December 1954. Few weeds green (½ % or less). Bases of Bda green still. No signs of cutting all Bda in spots, & no obvious digging for roots. 1/10 cirrus, clear, light breeze, & near freezing, but comfortable in sunshine. Doubtful that any shot here this year, though from car one might get a fair shot at one at about 120 yds. range. Very wary in gen'l. Asm half green some sites but no evidence current eating by C. l. Probably feeding on Bda mainly. // ½ mile N of the E-W fence are old burrows that, last spring, I investigated & decided were unused. Today I saw 2 C. l. there, possibly invasion from another area. Vegetation sparse & short there. // Dog (house) droppings on many mounds of the Spring Canyon Dam colony. // The work of ecology class here showed ave 22.4 burrows/A. on ~~area~~ 2½ acres (5 X 5 chains) just S of fence with ~~E. edg~~ E edge at lowest bottom. 8 measurements of max. slope of highest burrows at E. edge read 9 to 15¾ Topo. (× 1½ for %), median 12¾-13. None ~~apparently~~ apparently active over 13½ T. Penetrometer measurements near 20 burrows gave readings 140 to 280. Harder (to 300) on ridge to E. above upper limit burrows.
December 6, 1955. In afternoon visited Spring Canyon

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December 6, 1955 Nr. Ft. Collins, Colo.
dam colony. About 6" fluffy snow on ground, probably no new since morning of Dec. 3. Looked at nearly all burrows. #15 had scats & tracks at entrance; possibly 1 other with tracks 2' out. Many dog tracks visiting burrows. Cattle still in pasture S. of fence. Very cold, below 0°, some recent nights. Rabbit tracks common.

December 9, 1955 No snow since last visit to Spring Canyon Dam colony, but strong wind yesterday blew snow about, & now about 1/3 ground free of snow. I visited about 3/4 of burrows but saw no signs activity above ground. Wind blown snow may have plugged burrows. Usual mouse & rabbit tracks. Basal parts of *Bda* still green, so good food available. No eating *Opuntia* or digging of any sort seen. Grass about 1" tall & ground to N. of fence not nearly as bare as last March. || No new snow then until Dec. 14, but temps. probably over 50°F. some afternoons. Chester Brooks writes from Medora, N. Dakota, ~~that~~ winter set in early, cold, stormy there. I suspect low survival in Beef Corral town if dry fall & early winter unfavorable to dogs.

December 14, 1955 Nr. Wellington, Colo.
Visited Wellington preserve. Only about 10% of ground snow covered. Cold breeze but clear & sunny. I saw 2 dogs out at N S E corner colony. These took alarm at 200 yds. & went down same burrow. In exclosure much more *Eriogonum* than outside, but

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December 14, 1955 Nr. Wellington, Larimer Co., Colo.

snow covered most veg. in exclosure. Where most *C. l.* *Bdg* stubs only remained, + occasional dead-appearing clumps *Muhl. torr*. *Atriplex* still green leaved. *Kochia* mostly in place, not having tumbled, + fairly thick on lower sites near bottom (saline). Apparently no chance range recovery while so many *C.l.*, other rodents, + rabbits present, tho no large herbivores. Saw one *Lepus* *townsendi* in horse pasture. Ground there not as bare as last March as much *Kochia* standing. No *Opuntia* in ~~the~~ these ~~colony~~ colonies.

December 15, 1955 Visited Wellington ~~Co~~ preserve town + saw 3 dogs (only) out, at SE corner as yesterday. These at two burrows 20' apart. I set 3 steel traps there + 2 live traps near by. Set 1:30. Returned 4:30 + found no fresh tracks ~~near~~ at the burrows, + no catch in live traps (took up these, left steel traps). Apparently in wintry weather dogs go down + stay when disturbed. Clear + sunny but cold, perhaps 25°F. No greenery but ~~forbs~~ shrubs apparent here. // Then drove to *CPER* colony in *NW Weld Co.* Snow drifts about 2' deep along E-W fence line. Light snow over most of ground. My exclosure with about one ft. snow on it. Near exclosure one burrow had tracks going in, + another near 28 W 2N. None N. of S. end of my line transect was surely used currently by *C. l.*, tho some open with cottontail tracks apparently entering. Many *Sylvilagus* and *Lepus* tracks in area. Near 26 W 2 S + 24 W 4 S, there were 7 *C. l.* out feeding. Inspection area re-

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December 15, 1955 CPER, NW Weld Co., Colorado.

vealed much eating of Opuntia. Some clumps had 4 or 5 leaves about half consumed (out of 20± stems), & some leaves free & cut off. This fresh work on succulent stems. Within 50' of currently used mound every clump cactus had fresh chewings. Rabbits may do some of this. Some fresh repair mounds - scratching & butting - utilizing moisture of melted snow & ground. In general mounds & ground frozen very hard. // Examined fresh droppings & found red nodes of Bda stolons among other materials. Tufts of Bgr about one foot across had been grubbed heavily until little left, this evidently work of C. l. Bases grass (Bda, Bgr) still green! // One burrow at NE part colony near 4 W 8 S definitely used, & cactus near eaten. // Grass here utilized to near maximum by cattle, both in & out of dog town. But used conspicuously less on CPER side fence. Tall weeds, such as Ska, nearly all cleared from ground by blowing. Gut. sarothrae about 9" high common. // An Aquila chrys. seen flying near colony, & another atop hill 1/4 mile N. of colony. I picked up 5 eagle casts from atop this hill, where gathered on previous occasions. // I set 3 steel traps in area S. of exclosure on used burrows where dogs seen). ~~At Wellington colony took up traps~~ // Examined several fresh pellets. Contained about 30% Opuntia skin, ~~10~~ 5% Bda stolons, 30% grass blades & bases, to 5% black species a forb x-1, 10% woody material, 10% other. Grass & Opuntia principal remains.

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December 16, 1955 Larimer & Weld Cos, Colo.
Strong warm wind melted much snow today. At Wellington preserve saw no C. l., but a Sylvilagus in one of my 3 steel traps; in one at mouth of C.l. burrow. At CPER too I saw none, & none in 3 steel traps, nor any sign activity since traps set yesterday. Wind inhibits activity? Much warmer (20° more) this afternoon than yesterday p.m. // Yesterday several C. l. burrows at CPER had snow plugs but small hole as if mouse had entered. ~~Sever~~ Several had frosty-edged opening showing no immediate use but possibly animal respiring within. // Saw 1 Buteo near Wellington preserve, but none, nor eagles, nor carnivore tracks, at CPER colony (Sec. 22). Nr. Wellington, Larimer Co, Colo.

December 18, 1955 Left 3 steel traps set (see above) in Wellington preserve. This afternoon one sprung, with Sylvilagus foot, 1 gone (wire broke). Took up ~~tracks~~ traps. ~~Saw no C.l. out here today~~ Nr. Ft. Collins, Colo.

December 20, 1955 About 2 p.m. visited Spring Canyon Dam colony. Warm, calm, snow melting fast, but sections of ground still covered with snow. I saw at least 12 out, apparently feeding, not over 2 near at any site. No shrinkage colony extent, as fresh tracks at S. extremity of summer extension. Made overlay maps showing locations where dogs seen. Many burrows open, as if by cottontails, & saw 1 Sylvilagus at mouth burrow; it ran in. Still a fair cover of Buchloe, green at base. No digging found. In one burrow found 2-3" long sections Sha stem. I set 10 steel traps, buried, at mouths burrows. Probably none out today after I left.

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December 21, 1955 Nr. Ft. Collins, Colo.

about 1 p.m. visited Spring Canyon Dam colony. Saw 3 dogs out. One ♂ (190) in trap 17. No others sprung + no sign of use burrows since yesterday. Set 4 more traps so 14 total out. Apparently Verbascum and Xanthium ~~seem to~~ have grown little this year, tho used as food here last winter. Outside of dog area many dry seedstalks Bgr, tho few inside. Scattering of cut-off dry Sha still in place – does cutting or browsing it prevent blowing? Not improbably, thinks Don Hervey of range mgt. dept, + if so even cutting Sha economical as compared to repairing fences. // ♂190 judged ~~young~~ juv. by tooth wear (more worn than youngest tho), & was fat; no scrotal pigment; 950 gms.; about half stom. cont. green pubescent leaves of forb or browse; only 25% grass, including Bda stolons, all dry.

December 22, 1955. At same colony took ♂191 from trap nr. s. end line transect (Parker) at 1 p.m. Another trap (#14) sprung. Pulled off foot of dog in trap ~~near~~ at pass near S. end colony. It held so hard lost foot rather than grips. // Set 1 additional trap. No activity at most holes where traps set, so probably all not out every good warm day. Only ♂♂ out? Tiny forbs, mostly Sphaeralcea (+ Cirsium ?) about 1/8 to 1/2" tall, common, but <1% of vegetation. Apparently Sphaeralcea main food in ♂190, tho green grass present. Gutierrezia + Chrysothamnus both have green herbage, but latter ~~g~~ plant browsed short by cattle. Set 1 more trap, so 15 set (left 2 p.m.). // ♂191 stomach full, 60 gms., & contained 50% dry grass, probably Bda + stolons, but about 25% green forb, apparently Sphaeralcea. No odor;

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December 22, 1955 Nr. Ft. Collins, Colo.

but some scrotal pigment; no sperm in cauda epid.; testes abdominal. Large fat ♂. // Talked with G. E. Klipple of ARS. He loaned me data on vegetation of pasture & exclosure in Sec. 22. He said ~~that~~ in exclosures forage improves for a few years, then may go back. Bgr may grow, then die back in late summer. Bgr greens earlier than Bda so eaten early. Not increase with even mod. or light use, decreases & Bda increases heavy use. Bda increased on range between 1946-48 and 1952-53. In heavy use pasture held own, in mod. use lost about 25%, with light use lost about 33%. Bgr had 25% loss with no use & moderate use, 35% loss with heavy use. // Stipa & Carex may green up very early if they grow previous fall. Asm greens up early, purplish shoots, as early as March 15, sometimes a month later. Cut low by dogs, so harms growth (also eaten early in season before Bgr. One yr. Bgr not grow much until Sept. Rain distribution generally more important than grazing in vegetational effect, if grazing use not heavy. Asm seed more important than in Bda-Bgr. Bda usually starts first in bared ground. Bgr starts fast where cactus cover. Asm may be alive but not show above ground, & able to grow. Muhly torreyi stays about same regardless of grazing; not utilized by cattle; short-lived. // Sect. 22 has moderate use, about 42 head/section average in CPER, but about 50 head/A. sect. in SW quarter, but use out-

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December 22, 1955 Ft. Collins, Colo.

side of CPER irregular. // Colony in Sec. 22 surely there spring of '52, may have started '51. Only invasions occurring recent years were in 1951. In late summer, about Aug., one dog found in Sec. 7 W., with 3 burrows at edge of a bottom. This one shot, a large ♀ (so large & fat first thought pregnant). Another dog found in Sec. 15 W. Shot same time. Both apparently single as none there after shot. Also at edge swale or bottom. Both these dogs were in light use pastures.

December 23, 1955 Warm again but strong wind from west, & ~~most~~ much dust blowing on plains. I visited traps at Spring Canyon Dam colony. One Sylvilagus (Trap #18) in traps but no Cynomys (11 a.m.), nor fresh sign. Many traps uncovered by wind. Perhaps overcast & wind unfavorable to activity more than cold is. Left 15 traps set. Wind diminished midday. I visited Wellington preserve town & saw none out, nor any sure fresh sign. Near my exclosure three burrows dug out, as if by badger, & two others 50 to 100 yds. distant. Diggings within past few weeks & some very recent. ~~Ik~~ Took photos of my exclosure. Striking contrast inside with outside. Inside much growth Eriogonum, Kochia, Cryptantha (?), Stipa, [illegible], but only short forbs or bare ground outside. However much of effect probably due to protective effect of chicken wire - protects from wind, causes snow to accumulate on ground in exclosure. Any small exclosure is bound to give indecisive picture in area where wind

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December 23, 1955 Nr. Wellington, N. Colo.

is important. Several sacks of grain had been dumped in main part of colony (within last few days), but no sign of C. l. eating yet. Nr. Ft. Collins, Colo.

December 25, 1955. Checked Spring Canyon Dam colony traps about. No catch. Took up 2 traps, leaving 13. Warm & calm today - most pleasant weather since early Nov. At this colony most mounds & burrows cover area 3' in diam.; tho some mounds 6' across. Bared area about 6' diam., & half bared area 10'. In some areas where sod scratched out, hundreds of fine roots protrude out of bare soil & upward, hairlike. Nr. Wellington, Colo.

December 26, 1955. Another warm calm day, but 1/2 overcast. Temp. probably over 60° midday. At Wellington preserve colony at 10:30 a.m. I saw 4 out in census area, where not seen since October; 3 at 1 burrow. Appeared small, juv.// Then drove to CPER Sec. 22, colony, Weld Co. Saw about 25 dogs out, throughout colony. Some seen in peripheral expansion areas, ~~[illegible]~~ such as the S. one, & fresh sign & mound repair at crater near , at north end of expansion. So, no general retraction into old part of colony from areas new expansion. One eagle perched atop hill 1/4 mile N. of colony (I picked up a large cast there), & another seen flying 1/4 mile distant.// I shot a small ♂ #192 near 20 W 10 S at about 11 a.m. This near edge of S. expansion. Some Bgr leaves still green. Shot a large ♂ near 20 W 4 S (♂193). No dogs or sign to E. of fence - so trapping out in summer keeps out for rest of year, perhaps until late spring. Russian thistle

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December 26, 1955 CPER, Weld Co., Colo.

piled against west side fence, & only remaining snow a long bank 2' deep on lee side of this fence. Photoed thistle & snow here. Exclosure still too snow-covered to photo. Much repair of mounds throughout colony, using moisture of melted snow, so mounds as high as ever. Coyote tracks near several burrows at E. end colony, & droppings on mounds at extreme NW. end, but no kill found. About 12 M. shot ♂ 194, near . It had frozen in open, & died in mouth burrow 10' distant. Evidence feeding by C. l. not strongly apparent, but some cactus leaves cut. Apparently ♂♂ most active winter. // This pasture as overgrazed outside dog town as in it. Some Ska has not blown away even where no C. l. & not browsed short, so effect C. l. in reducing blowing away of Ska not evident. // At Spring Canyon Dam colony, nr. Ft. Collins, Colo., took up all traps. One fat ♀ #195 taken near S. end of [illegible]-transect line. Little other sign activity. I have taken none to N. of fence tho at least 2 have been seen out there at W. side. Sphaeralcea growing fast & furnishes abundant green food now.